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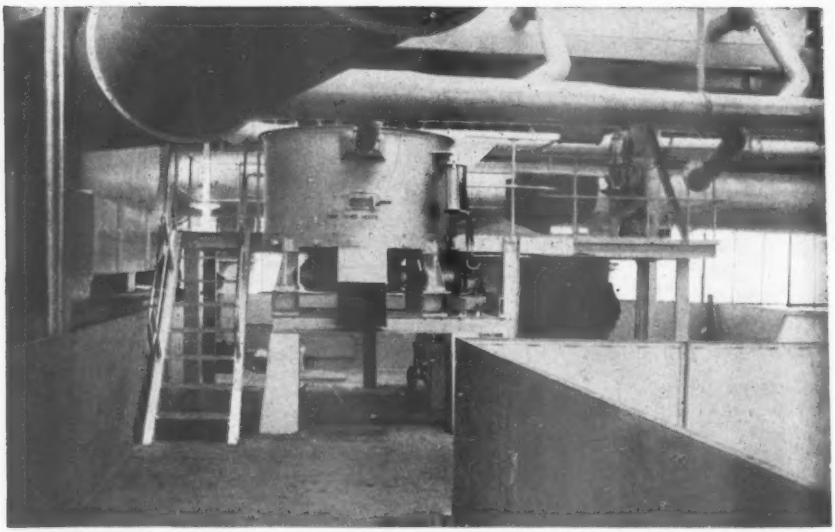

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FOUNDRY
TRADE JOURNAL

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"Parkinson's Law"*

When we first read this amazingly successful book, we regarded it as a parody on the actual operation of large organizations. We appreciated to the full its wit and humour, but we did not deem that it was to be taken seriously. Yet we learn that in the finance and other committees of public authorities, there is frequently the interruption—"But Mr. Chairman isn't this another case of the application of Parkinson's Law?" This, of course, in a practical sense does stress its importance. The author puts forward the idea that the administrative staff of a concern expands and retains full activity through each one from the head downwards acquiring two assistants, each handling half the original job. Fundamentally, however, where in general Parkinson's Law fails, lies in the fact that an overworked executive is invariably granted one—not two assistants—and still more rarely is any assistant allowed two people to help him.

The book, however, is not solely devoted to the "Rising Pyramid," and the author's comments on work of finance committees are only too true, when the major items involving large sums of money are dismissed with virtually no comment, whilst trivial matters are scrutinized with a maximum of care. He failed to comment on the frequently encountered case, where a back-bencher makes a sound suggestion. Then the chairman asks for the views of a V.I.P. present and if he confirms the suggestion, then thereafter the suggestion is treated as coming from the V.I.P. We have even known a sub-committee to be formed as a result, leaving out the originator of the notion.

Especially intriguing is the chapter on "Plans and Plants," which enunciates the notion that once a magnificent palace has been built to house the organization, decline sets in. Here our memory takes us back to the years following the first war, when not a few industrial concerns built themselves fine new office blocks, only to find that within quite a short while they were in financial difficulties. Yet, on the other hand, there are many of the foremost and financially sound firms which have provided themselves with magnificent office blocks. Professor Parkinson's book is not very constructive, but because it shows up very clearly the potential weaknesses of large-scale administration it will have a salutary effect by its impact on the conduct of council and committee work throughout many countries.

* "Parkinson's Law, or the Pursuit of Progress," by C. Northcote Parkinson, published (at 12s. 6d.) by John Murray, Albemarle Street, London, W.1.

Corrosion Discussions in US

The International Nickel Company, Inc., are holding the Sixteenth Meeting of Marine and Power Engineers at Wrightsville, near Wilmington, North Carolina, USA, during the week September 22 to 27. These meetings are a popular annual event in America and are arranged to discuss corrosion problems generally—together with inspection of the corrosion testing stations at Kure Beach and Harbour Island—and are well attended by representatives from public utilities, consulting engineers, naval architects, marine engineers, marine underwriters, shipyards, equipment manufacturers, founders, the US navy and US coastguard service.

This year invitations have been extended to engineering concerns in Great Britain and Europe to participate in this meeting and to date the European party travelling to America for the meeting will include the following:—

Great Britain: Mr. J. Arnott (chief metallurgist), G. & J. Weir, Limited; Mr. F. Hudson (metallurgical engineer), Mond Nickel Company, Limited; Mr. L. Kenworthy (secretary, Admiralty Corrosion Panel), Admiralty Materials Laboratory, Poole; Mr. A. M. McConnell (assistant chief metallurgist), G. & J. Weir, Limited; Mr. W. J. Roberts (principal surveyor for USA), Lloyd's Register of Shipping; Mr. J. F. Stanners (senior investigator, Corrosion Section) British Iron and Steel Research Association, and Mr. A. P. Wright (chairman and managing director), T. M. Birkett, Billington & Newton, Limited.

Italy: Ing. Italo Massenti (corrosion engineer), Ansaldo Cantieri Navali, Genoa, and Ing. Vincenzo Zagnoli (foundry manager), Ansaldo Fonderia Ghisa e Metalli, Genoa.

Spain: Mr. Gregorio Lopez Bravo (shipbuilding general manager), Sociedad Espanôla de Construccion Naval, Bilbao.

The agenda for the discussions at the technical sessions will cover the development of suitable materials (including castings) for use in evaporators, steam turbines, condensers, boilers, pumps and valves, etc. A special session will cover the problems arising in the production of high-tensile aluminium-bronze castings, such as marine propellers, and the advantages which arise through the use of these. The subject of cathodic protection will also receive prominent attention.

Previous to the technical sessions, a week of works visits and on-the-spot discussions, beginning on September 15, have been arranged for the benefit of European delegates. Inspections will be made of such well-known concerns as Brooklyn Navy Yard, Bethlehem Shipbuilding Company, Philadelphia Navy Yard, Newport News Shipbuilding Company, the Bayonne laboratory of the International Nickel Company, Inc., etc.

Others interested (even at this late stage) in attending this meeting should get in touch immediately with Mr. F. Hudson, Development and Research Department, Mond Nickel Company, Limited, Millbank, London, S.W.1.

Peruvian Market for Builders' Hardware

The Export Services Branch of the Board of Trade—Lacon House, Theobalds Road, London, W.C.1—has prepared a report (Reference Com/14956) on the Peruvian market for builders' hardware. This market has an annual value of the order of £1,250,000 but of this only £60,000 is spent in this country. Foundries manufacturing baths, flushing cisterns and the like, should certainly procure a copy of this informative report.

Correspondence

TAPE-RECORDED FOUNDRY TALKS

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—In a personal letter from you (December 16, 1957), I recall your making comments on our tape recording of foundry talks in this country. We have found that we have received a wide acceptance of the idea. Do you know of any individual or company which is practising tape recording of foundry meetings? We would like to make contact with someone abroad who may be doing this identical thing so that we may exchange technical talks which are available.

We have over 50 complete tape-recordings at our AFS library and we are hoping for continued programming for 1959. We have had requests from individuals abroad for copies of these tapes and wondered whether or not you had occasion to meet anyone who was using this idea for educational purposes.—Yours, etc.

GEORGE DISYLVESTRO,
Director of Foundry Research.

American Colloid Company,
5100 Suffield Court,
Gross Point Road,
Skokie, Ill., USA.
August 7, 1958.

This letter has been abridged. Editor.

Australian Foundry Centenary

It is not very unusual for foundry concerns in this country to celebrate the centenary of their creation. For the Dominions, however, such events are exceptional and thus congratulations are offered to E. Backwell & Son, Pty., Limited, of Geelong—a city not very far from Melbourne. A booklet has been issued to commemorate the event and the opening sentence reads as follow:—

"Ebenezer Backwell, the founder of the business, was born in Guernsey, Channel Islands, in 1821, and came to Australia in the ship Bombay. The Bombay was a sailing ship of 1,279 tons, and after picking up passengers in London, finally sailed from Plymouth on August 29, 1852, and arrived in Melbourne on December 14, a voyage of almost four months. Of the 723 passengers on board, 26 died during the voyage. On arrival in Melbourne, Ebenezer was immediately engaged by a Mr. Darby of Bourke Street, at a wage of £2 2s. 0d. a week."

The firm now manufactures domestic heating stoves, after starting out as a blacksmiths' shop. This year, the foundry is being moved away from the centre of the city—which now has a population of 88,000—to the suburbs—Wood Street, East Geelong. The managing director, Mr. K. L. Backwell, who was in this country in 1952, has for the last two years been mayor of Geelong.

British Standards Institution

Nearly 1,500 manufacturers licensed to use the British Standards Institution's "Kite-mark" on their products are included in two lists just published by the Institution. Industrial goods and consumer goods are separated into List "A," and List "B" respectively. Copies of both lists, which have been prepared mainly to help buyers who want to know on what goods they can find the assurance of the "Kite-mark," may be obtained from British Standards Institution, Sales Branch, 2, Park Street, London, W.1. price 2s. each. (Postage is charged extra to non-subscribers).

Measurement of Casting Surface-roughness

*By C. H. Good and C. E. McQuiston**

The need for reliable methods of measuring surface-roughness has become more urgent in the casting industry with the increased awareness of both the direct economic and the indirect sales value of improved surface finish. In the following article the various terms used in the study of surface roughness are defined and a survey is given of the methods available for evaluation and control of this factor. The conclusion is that the stylus-type instrument would seem to be the most effective device to date for use by the machining industry in roughness determination.

Casting surface-roughness has become an important consideration in the production of castings in all sections of the foundry industry[1]. Undoubtedly, the development of shell moulding and the rapid growth of the investment-casting industry have played a major role in focusing attention on casting roughness throughout the entire industry. There are two general reasons why the foundry industry is concerned with surface roughness:—(1) Surface appearance is an important sales consideration, and (2) economies can be derived by both the customer and the foundry by improvement of surface finish.

To evaluate and control surface finish, there must be some qualitative and quantitative measure of roughness available, as well as a common understanding of the problem between parties. The purpose of this article is to define the many terms applied to surface finish of cast surfaces and to discuss the various methods available for the evaluation and control of surface roughness.

Definitions

What then is surface finish? The following definitions are presented in the ASA† standard B46.1-1955 which covers surface-roughness, waviness and lay[2]:—

"2-1 *Surface.* The surface of an object is the boundary which separates that object from another object or substance. This standard relates to surfaces produced by such means as machining, abrading, extruding, casting, moulding, forging, rolling, coating, plating, blasting, or burnishing.

"2-2 *Nominal Surface.* The theoretically accurate design, the shape and extent of which is usually shown and dimensioned on a drawing or descriptive specification.

"2-3 *Surface Irregularities.* Deviations from the nominal surface including roughness and waviness.

"2-4 *Profile.* The contour of a section perpendicular to a surface unless some other angle is specified.

"2-5 *Roughness.* Relatively finely-spaced surface irregularities, the height, width, and direction of which establish the predominant surface pattern. Irregularities produced by cutting edges and machine-tool feed may be considered roughness. The height is rated in micro-inches arithmetical average deviation from the mean line: the symbol AA being used as the descriptive abreviation.

"2-6 *Waviness.* Irregularities of the nominal surface which are of greater spacing than roughness. These irregularities may result from such factors as machine or work deflections, vibration, heat-treatment, or warping strains. The height is rated in inches as the peak-to-valley distance.

"2-8 *Lay.* The direction of the predominant surface pattern, produced by tool marks or grains of the surface ordinarily determined by the production method used.

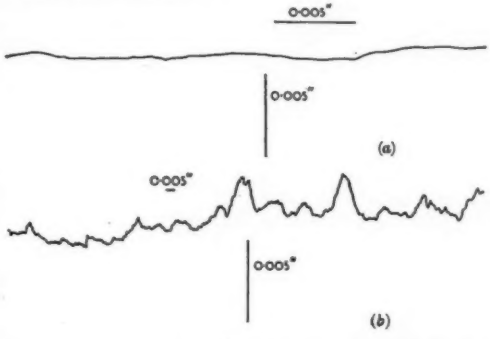


FIG. 1.—(*a*) *Surface profile magnified* × 500 *in both directions;* (*b*) *as* (*a*) *but with the horizontal picture foreshortened.*

"2-9 *Flaws.* Irregularities which occur at one place, or at relatively infrequent intervals in the surface, *e.g.*, a scratch, ridge, hole, peak, crack, or check.

"2-10 *Micro-inch.* One millionth of an inch (0.000001 in.)."

As can be seen in 2-1, the definitions are supposed to be broad enough to include all processing techniques, however, the illustrations all refer to machined surfaces. In a cast surface, the predominant surface pattern is produced by the mould

* The Authors are respectively plant manager, Micrometrical Development Corporation, Ann Arbor, Michigan, and quality control manager, Advance Foundry Company, Dayton, Ohio.

† American Standards Association.

Casting Surface-roughness

surface which may be machined or made up of bonded-sand particles. The basic definition as established in the standard would apply to the cast surface, even though the examples in the definition do not relate to cast surfaces. The same is true of the waviness, lay and flaws. Illustrations of these would include shrinkage and non-conformity to the pattern, random lay, gas defects and sand inclusions respectively.

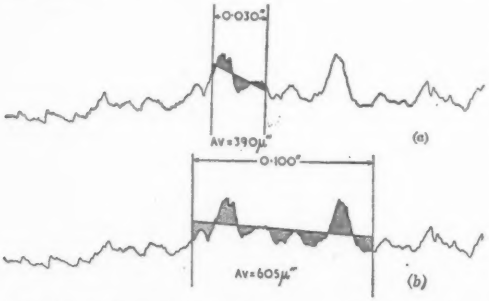


FIG. 2.—*Difference obtained in using the standard 0.030-in. cut-off value and the 0.100-in. cut-off value.*

With these definitions in mind, it would be well to look at a typical cast surface profile as shown in Fig. 1 (a). This is a true-surface profile magnified 500 times in both directions. In such a picture, it is difficult to appreciate the variations in the surface,

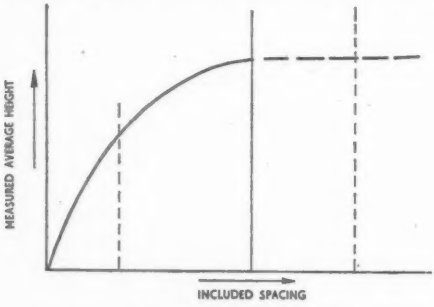


FIG. 3.—*General curve relating micro-inch roughness value to the roughness width cut-off for a specific surface. The solid line represents the increase in reading as the roughness width cut-off value approaches the maximum roughness width; the dotted line indicates the levelling off of the roughness reading with any further increase in cut-off.*

since the heights of these variations are usually of considerably less magnitude than the spacing differences. For that reason, surface profiles are usually modified to accentuate the vertical dimensions with respect to the horizontal spacings as shown in Fig. 1 (b). Note that the vertical magnification is the same while the horizontal picture has been foreshortened.

If all these definitions are applicable to cast surfaces, why has it been said that "micro-inch roughness designations with instruments in current use for measuring other types of surfaces have been found unsatisfactory for specifying finishes on as-cast surfaces? "[3]. The reason is to be found in the roughness-width cut-off. This is defined in the ASA standard as follows:—"2-7 Roughness-width Cut-off. The maximum width in inches of surface irregularities to be included in the measurement of roughness height. Roughness may be considered as superposed on a wavy surface."

This means that some arbitrary dividing line must be established between roughness and waviness. As stated in the standard, "The value 0.030 in. is preferred for most surfaces and is to be used unless otherwise specified." While this value is satisfactory for machined surfaces, it can readily be seen that there are irregularities in

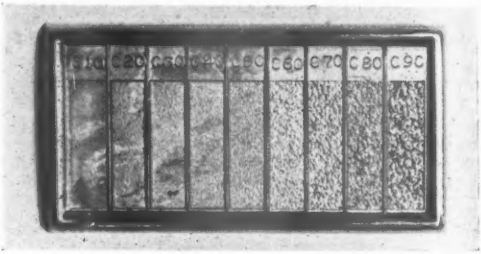


FIG. 4.—*Visual-tactual comparator for estimating surface-roughness.*

Fig. 1 (b), with spacings in excess of 0.030 in. which would be excluded from the roughness reading if the 0.030 in. cut-off were used. Fig. 2 illustrates the difference that is obtained in using the standard 0.030 in. cut-off value and using a 0.100 in. cut-off value. It can be seen that the average increases for the larger cut-off value. This leads to the general curve shown in Fig. 3 relating micro-inch roughness value to roughness width cut-off for a specific surface. The solid part of the curve represents the increase in reading as the roughness width cut-off value approaches the maximum roughness width. The broken line section of the curve represents a levelling off of the roughness reading with any further increase in cut-off.

From this curve, it can readily be seen that if the instrument is designed to operate at a cut-off greater than the maximum roughness width (the solid vertical line), then the measured average height will be equal to the maximum roughness height, but if the cut-off is less than the maximum roughness width then the measured average height will be something less than the maximum roughness height. This is why it was previously stated that present instruments would not work on cast sur-

faces since they are usually designed to measure 0.030 in. or less cut-off while many castings have wider spacings.

If the instrument is designed to operate at a 0.100 in. cut-off value, it is apparent that 100 per cent. readings will be obtained whether the maximum roughness value is 0.020 in. or 0.080 in. If, then, as tests indicate, the maximum roughness width of castings is under 0.100 in. and an instrument can measure up to 0.100 in. spacings, then the instrument would work on all cast surfaces as well as the machined surfaces.

Considerable time has been spent discussing roughness-width cut-off since its effects are most noticed and because it is perhaps the most difficult concept of surface-finish measurement. Now that the various terms have been explained, it is possible to proceed to the discussion of methods of evaluating surface roughness.

Methods of Measurement

It is important first to realize that a method of evaluating surface-roughness by definition should not evaluate the effects of waviness or flaws since they are caused by different conditions and should be controlled separately. There are certain criteria which should be considered when discussing these various methods, and these are as follow:—(1) Is the method suited to all types of cast surfaces; *i.e.*, will it work equally well on sand surfaces and die-cast surfaces and perhaps even on machine surfaces? (2) Does the rating of the method correlate with the surface roughness of the part as defined above, or does it merely provide a repeatable figure not necessarily correlated with the roughness? (3) How well is the method able to repeat on the same surface? (4) Can the method be used on a variety of size, shape and roughness height parts? (5) Is the method easy to operate? (6) How much human judgment is involved?

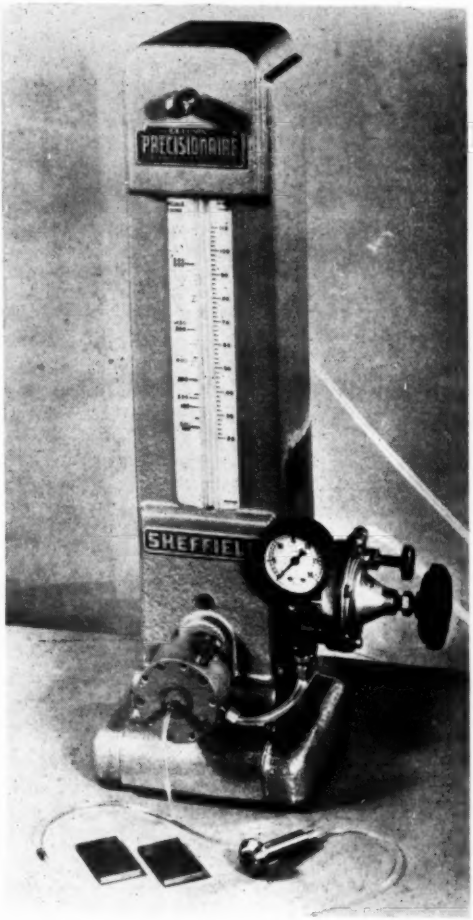
TABLE 1.—*Classification of Surfaces by Hobman Roughness Indicator.*

Class.	Symbol.	R.M.S.
0	R1/4	0—250
A	R1/2	250—500
B	R1	500—1,000
C	R2	1,000—2,000
D	R4	2,000—4,000
E	R8	4,000—8,000

When reviewing the various methods they should be considered in light of these criteria. The methods which will be discussed are visual-tactual comparators, air gauges, buffing techniques, height gauging and stylus-tracer techniques. Other techniques have been applied to the general field of surface measurement, but they are excluded from the discussion since they could not be applied practically to the casting industry.

The visual-tactual comparator shown in Fig. 4 is designed with patches of increasing roughness. These patches are given "C-ratings" which have equivalent RMS* roughness values as shown in Table 1. While the comparator is easy to use, and has reasonable correlation with the surface roughness, it is limited severely by the dependence on human judgment for rating and repeatability. It should be pointed out that even the comparator is better than nothing since it tempers human judgment. The air-gauge technique, as illustrated in Fig. 5, will eliminate the human judgment, and will provide an easy-to-operate means. However, the device is limited to flat or large diameter parts, and because of the way it operates, is not always repeatable. The air gauge, in a simplified description, merely measures the air escapement from under the pick-up head. This air escapement is proportional to the area between the pick-up head and the surface to be checked. Fig. 6 shows the same surface with the pick-up shifted slightly and the large increase in area resulting. Thus, it is not

FIG. 5.—*Surface-measuring instrument based on the air escapement from under the pick-up head.*

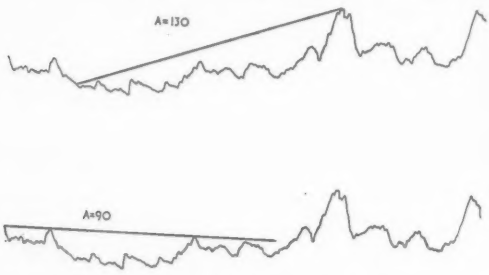


* Root Mean Square, deviation from flat in micro-inches.

difficult to obtain various readings on the same surface. However, if a large number of individual readings are taken and averaged, a representative rating may be obtained.

Neither of the above two uses has been cited by researchers, but since they are adaptable to production checking, they are reviewed here. One of the first techniques reported to the foundry was a buffing technique where the weight loss due to

FIG. 6.—*Two results given by the instrument shown in Fig. 5 with the pick-up moved slightly.*



buffing was considered as proportionate to the finish[4]. While this assumption is probably valid for duplicate castings, it is very difficult to apply this criteria to castings of varying surface area. Also, the limiting point of the buffing process, when five to ten pits are noticeable on the surface, is not one which is definite. The shortcomings of this technique were readily recognized and it was not used in later studies.

Classification of Surface

The next approach is the Hobman roughness-indicator, which consists of a dial indicator mounted

FIG. 7.—*Height-gauge technique on a surface plate with four readings taken at 20 different areas.*

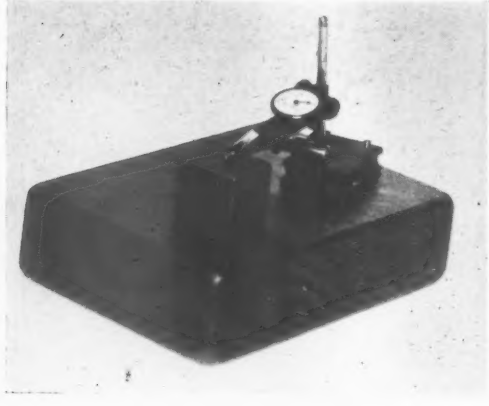


FIG. 8.—*Third method of measurement—this instrument was used for taking the true-surface profiles mentioned in the article.*

on a tripod which rests on the surface to be checked and a phonograph needle mounted on the indicator stem such that it can be rotated in a circular path of ½-in. circumference[5]. By measuring a large number of heights around this path and computing the average of these heights, the roughness of the surface can be computed. The surfaces are classified in the manner shown in Table 1. While the device may produce repeatable readings proportionate to the surface roughness, the computations limit its application to production checking.

Another height-gauge technique is the standard height-gauge on a surface plate (illustrated in Fig. 7) with four readings taken at twenty different areas, and the average of the ranges of these groups used as the roughness of the part[6]. This technique has the advantage over the Hobman device of being usable on curved surfaces so long as they have a straight segment, such as a cylinder or a cone, but it still requires a large number of calculations.

A third method for this type of measurement is shown in Fig. 8. The instrument was used for taking the true-surface profiles used in this article. There are many desirable features to this machine, but it would not be suited to the production checking of castings. It is well suited to research work and is quite beneficial in that application. Fig. 9 shows one of the major limitations of any of the above height-gauging techniques. In each case, there is no assurance that the plane of the reference surface is parallel to the line of the trace and, thus, much larger ranges show up than actually exist.

Stylus-tracer Instrument

The final approach to be discussed is the stylus-tracer method. This is the method used by most

of the machining industry as indicated in section 4-2 of the ASA standard in the following paragraph:—

4-2 *Scope.* Although a number of instruments for measuring surface roughness have been devised which employ optical, acoustical, mechanical, and pneumatic principles, the large majority of instruments in use for measuring surface roughness depend on electrical amplification of the motion of a stylus perpendicular to the surface over which the stylus is traversed. As other types of instruments are not widely used, this standard is concerned only with tracer-type instruments using stylus tracers and electrical amplification.

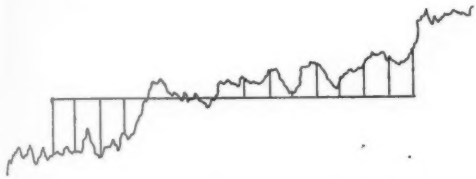


FIG. 9.—*One of the major limitations of many height-gauging techniques; in each case there is no assurance that the plane of the reference surface is parallel to the line of the trace.*

A typical stylus-type instrument is shown in Fig. 10. The stylus-type instrument seems to be the best of the devices since it will work on all cast surfaces and even machined surfaces while some methods, such as the comparator and air gauging, are limited in their range or type of surface. The stylus instrument is the only instrument which measures roughness only, while the others would include waviness and flaw effects. It has good repeatability as do the others except for the comparator and buffing methods, and it also has the widest range of sizes and shapes that it can accurately check, including o.d.'s, i.d.'s, flats and some irregular shapes. Finally, the stylus instrument is easy to operate mechanically and quite easy

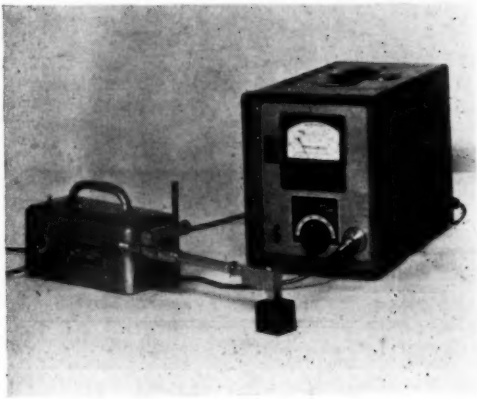


FIG. 10.—*Stylus-type instrument which is able to work on all cast surfaces and even machined surfaces.*

to operate manually. It is direct reading, and, thus, no computations are required.

Little human judgment is involved in its use. It has been the primary intent of this article to acquaint the foundryman with the need for practical methods of measuring surface-roughness and also to suggest definitions which would provide a common ground for discussing surface finish and last, to discuss possible means for measurement of surface-roughness.

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Industrial Injuries Claims

The drive to reduce the number of industrial injuries by the exercise of greater care is reflected in the number of claims for benefit in 1957. According to the annual report of the Ministry of Pensions and National Insurance, the number of claims dropped from 822,000 to 768,000. The cost of the benefit in the year ended March 31, 1957, was £12,750,000. The total estimated cost of disablement benefit and supplementary allowances was about £18,750,000.

Medical boards made more than 302,000 examinations in 1957 and, during the year, about 16,000 appeals were dealt with by 13 medical appeal tribunals, about 40 per cent. being found for the claimant.

Receipts of the Industrial Injuries Fund came to nearly £56,000,000, including over £42,000,000 from contributions of employers and insured persons and over £8,250,000 from the Exchequer. Expenditure amounted to £39,500,000, of which £34,500,000 was spent on benefits and £5,000,000 on administration.

Dorman, Long's Pension Scheme

In return for a weekly contribution of 2s. 6d. per week, the 25,000 employees of Dorman, Long & Company, Limited, are offered a supplementary pension on retirement and a death benefit ranging from £250 to £600 after 20 years' service.

The new "security plan," as it is called, is outlined by the chairman, Sir Ellis Hunter, in a booklet. The scheme is to come into operation on October 6.

The retirement pension is to be at the rate of 1s. a week for each year of contributory service with 6d. per week for each year of eligible past service. If the response is satisfactory, retirement allowances will also be paid to those who are too old to join the scheme but otherwise would have been eligible to do so. In the event of a worker's death his contributions will be refunded, plus a sum of £250, rising to £600 after 20 years' service. Workmen may also pay extra contributions for increased pension rights.

American Letter

AFS 1958-59 Programme

Twenty-five members of the Technical Council of the American Foundrymen's Society met last June at the Sherman Hotel, Chicago, to chart the technical programme for Society activities during 1958-1959. Mr. James S. Vanick, International Nickel Company, New York, served as chairman. All AFS Divisions, submitted progress reports for 1957-1958 and made recommendations for the new fiscal year, which began July 1. $50,000 (about £16,000) was requested for additional research to advance the projects now in progress: *i.e.*—brass and bronze at the University of Michigan; malleable at the University of Wisconsin; grey iron, Case Institute of Technology; light metals, Battelle Memorial Institute. Sand research is carried on in seven separate projects, a co-operative effort within the industry. Work on steel research will begin at some university as soon as contracts are settled. For the first time, the AFS pattern division will conduct research to evaluate coatings for patterns.

Considerable concentration was directed to the papers to be featured at the 1959 AFS Castings Congress, to be presented jointly with the second AFS Engineered Castings Show—Hotels Sherman and Morrison, Chicago, April 13 to 17. Because of the dual appeal of the technical sessions, for both foundrymen and product-design engineers and castings users, the entire programme will revolve around subjects related to the design and engineering application of castings.

Standardization of Nomenclature

While delegates of the International Standards Organization met at Harrogate, about 1,800 US members of the American Society for Testing Materials met in Boston, June 22-27, to specify and standardize materials ranging from asphalt to zinc. British/American inconsistences of terminology which need standardization are (1) tons per square in.—lb. per square in., (2) fahrenheit degrees—centrigrade, (3) s.-g. iron—ductile—nodular, (4) gunmetal—tin bronze—red brass, (5) gray iron—grey iron, and (6) niobium—columbium*.

Along US Economic Lines

The US now has the largest number of unemployed in 17 years. To balance this statistic, the total number employed is found to be the largest ever and, in this sense, the percentage unemployed becomes correspondingly smaller. The data indicate a labour force of approximately 70,000,000 of which 5,500,000 are unemployed, representing approximately 7 per cent. of the total. This figure includes about 1,000,000 new applicants, most of whom graduated from schools into the working force during the last 30 days.

Recession economics still seem to be labour controlled. Prices in no way decrease but remain at existing levels. The work week shortens, the weekly income lessens and the hourly rates stand steady or tend to increase. Within one particular area, for example, the standard 40-hr. work week decreased to 38.6 hrs. in May and lifted to 39.2 hrs. in June, which is still one hour below 1957 figures.

The metal industries are undergoing severe readjustments. Mines producing copper, zinc and lead are looking to the Seaton† Plan of government subsidy or stockpiling at peak prices or tariffs to sustain operations. Most output has been cut at least 20 per cent. from the 1957 peak and some has been cut 40 per cent. Nickel, with two 10 per cent. cuts and a 20 per cent. cut, has been reduced to a total of about 88,000 long tons or about a 35 per cent. cut from its peak rate of approximately 139,000 tons annually.

The mining of coal and iron ore and the production of iron and steel are being adjusted to current needs without government help. The National Industrial Conference Board in its survey of current conditions reports that the US has been the hardest hit by the recession of all European and American countries.

Coremaking Processes in the US

A recent survey conducted by the market research department of the Penton Publishing Company indicates that 1,180 (26 per cent. of total) foundries are using the carbon-dioxide process, 480 (10 per cent.) are making shell cores and 550 (12 per cent.) are using cold-setting binders. Replies were received from 4,500 of the industry's 6,320 foundries.

* Notes:—(1) Confusion between "long" and "short" tons. (2) Semi-metric—*e.g.*, "Heat deg. C. per square inch of section." (3) "Ductile cast iron" eliminates "graphite-structure calisthenics." (4) "Gunmetal" considered obsolete. (5) "Gray iron"—spelling officially adopted by Gray Iron Founders' Society, Cleveland, Ohio, USA. (6) Columbium—officially adopted by AIME—American Institute of Mining, Metallurgical and Petroleum Engineers.

† US Secretary of the Interior.

Welcome for Scrap Decontrol

Decision of the Government to decontrol the price and distribution of iron and steel scrap from November 1 has met with widespread approbation. So too, has the Board of Trade's announcement that it is now prepared to consider applications for licences to export limited quantities of iron or steel scrap and old metal to all destinations other than to ports or countries in the Sino/Soviet bloc. A spokesman for the British Iron and Steel Federation said that the industry did not object to this limited degree of export freedom being granted for the time being in view of the temporary surplus of scrap. He expressed the hope that the abolition of price control would not cause too much upheaval in the scrap market.

Iron and steel scrap was brought under Government control at the outbreak of war in September, 1939, and since that time, until very recently, supplies of suitable scrap for the steelworks have been at a premium. But the position is now very different and, for the moment, anyway, there is certainly no longer any need for the restrictions.

Both merchants and consumers have large stocks of scrap on hand; in fact, many merchants are embarrassed by the huge quantities of metal in their yards. The market for scrap is weak here and on the Continent, so that it is unlikely that any large quantities will be shipped, but export opportunities may well increase later in the year when the controls on price and internal distribution cease. But that is a matter for conjecture and it is certain that the requirements of steelmakers in Britain will be very carefully guarded.

TWEEDALES & SMALLEY, LIMITED—Mr. F. R. W. Preston has resigned as chairman and Mr. E. G. Smalley has taken over the post. Mr. Preston has also resigned as a director.

ENGLISH ELECTRIC COMPANY OF SOUTH AFRICA (PTY.), LIMITED—Major-General C. J. Venter has joined the board. He is also a director of Marconi (South Africa), Limited, a member of the English Electric group. Major-General Venter is a foundation member of the South African Air Force and from 1945 to 1956 he was chief manager of South African Airways.

British Steel Castings Research Association

Extracts from Fifth Annual Report

The following extracts have been taken from the recently-issued report of the British Steel Castings Research Association covering the year's activities up to March 31, 1958:—

General

This report is the first to cover a full year's working in the Research Station which was officially opened by Sir Harry Jephcott, D.SC., M.SC., F.R.I.C., F.P.S., chairman of the Council for Scientific and Industrial Research on June 4, 1957. There is no doubt that the occupation of the new headquarters has given an impetus to the Association which has been reflected not only in the growth of all its numerous activities, but also in the use which members make of its services.

Council

It was considered to be appropriate to the growth in importance and activity of the Association, as well as to the increase in membership that has occurred in recent years, that the Council should be enlarged. A resolution increasing the maximum permissible number of elected members from 15 to 20 was, therefore, adopted at the annual general meeting held on July 3, 1957. Subsequently, the members retiring by rotation (Mr. J. Currie, Dr. R. Hunter, Mr. J. Jackson and Mr. R. J. Richardson) were re-elected, and Lord Clydesmuir, M.B.E., Mr. E. W. Colbeck, Mr. R. F. Horton and Mr. J. Mowat were elected additional members.

Membership

The membership of the Association has continued to grow. Two further companies have been elected ordinary members, and seven have been elected associate members, as follows:

Ordinary Members: British Transport Commission, and D. Napier & Sons, Limited.

Associate Members: Baker Perkins, Limited; Imperial Chemical Industries, Limited; Lincoln Electric Company, Limited; London & Scandinavian Metallurgical Company, Limited; Metropolitan-Vickers Electrical Company, Limited; Union Carbide, Limited and Wesman Engineering Company Private, Limited.

Unfortunately, the decision of the Daimler Company, Limited, to close their steel foundry has led to their withdrawal from membership.

Research Facilities

The initial period of operation in the Research Station has shown it to be generally satisfactory; but the volume of activity in which the Association is now engaged is substantially larger than was, or could have been, envisaged when the station was planned. For example, in 1954, it was estimated that the total permanent staff would be 36 by 1959, but in fact it already numbers 54. The result is that overcrowding has already developed in several sections, particularly in the chemistry laboratory and in bench-space generally, and in accommodation for senior investigators. Even the foundry floor space is fully occupied, and further accommodation will have to be provided in 1959 to maintain the present scale of operations, quite apart from any expansion that may be proposed.

Major items of equipment installed during the year include a British Moulding Machine BT.5 moulding machine (on loan from Hadfields, Limited), a shell-moulding machine, a microphotometer, noise-metering equipment, an electric heat-treatment furnace, and a heavy-duty lathe.

Staff

Work on two research projects relating to the surface quality and internal soundness of castings has been delayed for almost the whole year by inability to recruit a suitable graduate investigator. This difficulty has been experienced in spite of contacts established with numerous universities, and extensive advertising, and is familiar to the whole of the industry. The Council is convinced that the Research Association can play a most valuable part in recruiting to the industry the scientific and technical manpower that it requires to maintain its industrial position; but the problem must be tackled on a long-term basis. By making known the industry's needs; by establishing a high reputation for its laboratories; by acquainting new entrants to the industry with the technology of founding and the scientific approach to its problems, the Research Association can establish a nucleus of suitably-trained personnel and a channel for future recruitment. The policy of interchange of personnel between the Association and industry has already been declared, and can be expected to become operative in the next few years. Quite clearly, this policy cannot succeed without a sufficiently high rate of recruitment, and this aspect of the problem is currently engaging the Council's attention.

Conferences and Meetings

The Association's annual conference at York had as its theme "The Cleaning, Inspection and Welding of Steel Castings." More than 180 representatives of members registered for this event—an increase of almost 40 per cent. on the registrations of the previous year—and it was necessary to ask some members to reduce their representation because of the limitation imposed by the accommodation. Most of the papers presented to the conference were contributed by member companies and the Council places on record the Association's gratitude to the authors and the companies for having so readily made this information available to the other members of the Association. The Council has arranged for the

conference in 1958 to be held at Harrogate where larger accommodation is available.

As a large number of members in Scotland were unable to attend the official opening and open days, the Association staged a meeting and exhibition in Glasgow under the chairmanship of Dr. R. Hunter. A selection of portable exhibits was displayed and talks were given by three of the heads of the Association's sections on certain aspects of the research programme. A total of 85 representatives of all the members in Scotland attended the meeting.

An entirely new venture commenced during the year in the provision of refresher courses of short duration. The announcement of the first of these —on the subject of moulding materials—resulted in sufficient applications being received to necessitate the course being repeated three times. The first course was restricted to foremen and consisted of a series of eight lectures and practical sessions over a period of 3½ days. A large number of suggestions for other courses, and for courses for other types of personnel have been received from members and will be given careful consideration. It will be appreciated that the staff and accommodation available for this purpose at the Research Station are limited.

Publications

In addition to a comprehensive abstracting and translation service to members, in September, a special report entitled "Recommended Code of Practice for the Magnetic-particle Method of Inspecting Steel Castings" was issued, and represents a major part of the work of a sub-committee under Mr. J. Blackburn's chairmanship.

Thanks to the *Centre Technique des Industries de la Fonderie*, Paris, the Association has acquired the rights for an English language edition of the book on the design of steel castings originally prepared and issued by the *Centre* in French. This book—"A Practical Guide to the Design of Steel Castings"—should, if carefully distributed, go a long way to fill the long-felt need for a technical treatise on this subject suitable for the practising designer and the engineering student. The Association has arranged for the British Steel Founders' Association to co-operate in the distribution of the book in the United Kingdom.

Information and Advisory Services

The value of the various types of advisory and information service accorded by the library and senior scientific staff continues to be appreciated by an increasing number of members, both large and small. The variety of enquiry also continues to grow; many of them are for published information, although not always confined to the subjects for which the BSCRA library is specially equipped; and amongst the most frequent requests of this type are those requiring details of private or foreign specifications for steel castings. It is this fact that has led to the decision to prepare the publication on this subject referred to earlier.

In addition, some 300 technical enquiries have been dealt with during the year, many of them involving some laboratory work. The establishment of the Association's laboratory facilities has, of course, led to a noticeable increase in the number of enquiries of this type, and quite clearly it may become necessary to impose some limitation upon the use which any one member can make of this service. However, for the time being such enquiries are dealt with on condition first that they will not occupy more than one or two days of an investigator's time, and secondly that the information derived from answering the enquiry can be placed generally at the disposal of the Association's staff and other members, subject to the identity of the enquirer not being disclosed.

A third aspect of the Association's advisory services comprises development work, or the rendering of direct assistance to members seeking to apply the results of research. Until the industry is able to employ a larger number of suitably trained technologists without direct responsibility for production, and therefore free to undertake development work, the Association must provide such a service, if only to justify and demonstrate the value of its own work. Additionally, such activities keep the research staff closely in touch with the industry, so helping to ensure a practical approach to their investigations, and leading to improved relations between members and the Association.

External Relations

The cordial relations existing between the Association and the Steel Founders' Society of America have been further strengthened during the year by an extension of the basis of interchange of information and by the inception of the exchange-lecture scheme referred to in the last annual report. The Association now regularly receives from the SFSA their *Journal of Steel Castings Research* and *Steel Foundry Facts* as well as many of their *Research Reports*, and has been granted the privilege of reprinting any of this information in the BSCRA *Journal*. The first of the exchange lectures was delivered on behalf of the BSCRA to the SFSA conference in Cleveland in November, 1957, by Mr. L. W. Sanders of Lake & Elliot, Limited, and Mr. T. A. Cosh on the subject of the graphite-rod resistor furnace and immersion-pyrometer practice. The SFSA has been invited to nominate a speaker on the subject of "Deoxidation and Degassing of Steel" to attend the BSCRA's 1958 conference.

Close contact continues to be maintained with the British Steel Founders' Association, whose chairman is an *ex officio* member of the BSCRA Council. Liaison in the field of industrial health is maintained through the Joint Advisory Committee and the director's membership of the BSFA's Industrial Health Committee, and the directors of the two Associations hold regular meetings on other subjects of common interest. Particular mention is made of the co-operation between the staff and the regional discussion groups of BSFA and the

regional technical committee of the North-East Coast Association of Steelfounders. The Association welcomes the opportunities provided by these meetings for technical discussions with members and is especially grateful to those on the North-East Coast who are participating in a co-operative research project.

Opportunities frequently occur for consultation with other research associations and in many cases formalized bases of co-operation have been established.

The Factory Inspectorate's Joint Standing Committee on Conditions in Steel Foundries is now finalizing its first report to which the Association has contributed eight technical appendices.

RESEARCH

It is not surprising that the acquisition of such vastly improved facilities for research has resulted in marked progress being made with most of the projects included in the programme for 1957-58. Work on a few projects, however, has been limited by the difficulty in recruiting senior investigational staff. Consequent upon the progress which has been made, several projects can now be regarded as completed and the scope and object of others have been revised. A brief review of research progress during the past year is given below.

Steelmaking

Oxygen Injection in Basic-arc Furnaces

The programme of work to assess the effect of the variables: initial carbon level, metalloid content, temperature, injection rate, slag composition, etc., previously carried out in member foundries, is now being carried out in the Association's graphite-resistor-rod furnace under conditions of more stringent control than was possible in production furnaces. Over 100 heats of steel have been made at the Research Station during the past year. A comparison of results between production furnaces and the Association's furnace has shown that the values of oxygen utilization measured in terms of points of carbon removed per cubic foot of oxygen per ton of steel and the overall efficiency measured in terms of "cumulative potential" were equally applicable in all cases. There is thus no scale effect to be considered in the application of the data obtained in the resistor-rod furnace to production furnaces. The carbon-control chart, previously constructed from the oxygen survey made in member foundries, has now been reconstructed on the basis of the more accurate data obtained from the resistor-rod furnace. This chart is applicable to a bath temperature of 1,600 deg. C., prior to the injection of oxygen. The scope of the chart is being extended to take account of different initial temperature levels and the effect of the silicon and manganese content of the bath at the commencement of oxygen injection.

This work is being combined with a quantitative study of the relationship between fume evolution and the conditions of oxygen injection. A number of heats have been injected at abnormally high oxygen injection rates in order to generate fume, and quantitative data relating oxygen input rates to the density of the fume cloud have been obtained. Measurements of fume density have been made using a technique similar to that used in the Hexhlet dust sampler and also by collecting the rising fume on a glass plate placed at a fixed distance above the furnace door, the degree of obscuration of the plate being subsequently measured by means of a microphotometer. This work is being carried out in the hope that it might prove possible to minimize fume generation without greatly affecting the efficiency of carbon removal by adjustment of the conditions of oxygen injection.

Gas Flushing of Liquid Steel

The Association has carried out trials at the Research Station and has co-operated in trials in member foundries to test the efficiency of gas-flushing agents in removing hydrogen from molten steel in the ladle. Trials have been made with argon, polytetrafluoroethylene and with a proprietary material which decomposes at liquid steel temperatures to produce carbon-monoxide. The results of these trials have indicated that the removal of hydrogen by means of argon cannot be guaranteed if moisture be present, as it usually is, in the argon. Some promising results have, however, been obtained with the other media, but care must be exercised in the use of polytetrafluoroethylene, since it is known that a definite hazard to health may arise from the use of this material under certain circumstances.

Foundry Processes and Moulding Materials

Shell Moulding

A comprehensive investigation has been made of the effect of various resins, moulding materials and inorganic additives on the surface quality of shell-moulded low-carbon steel castings, which frequently show a defective surface-finish when cast in normal silica sand/resin mixtures. The test casting used for this work incorporated sections of ¼-in., ½-in. and 1-in. thickness. Ten different resins were tested, but all produced defective surfaces. Additions of manganese-dioxide, calcium carbonate and lead-dioxide, which have been claimed to produce improvement, were relatively ineffective except in the thinner casting sections where a slight improvement was noted. Resin-bonded zircon sand, with an addition of manganese-dioxide, produced a definite improvement in surface quality, but the best results were obtained with resin-bonded olivine sand with or without an addition of manganese-dioxide.

The use of inorganic instead of resin binders has also been investigated. Thermally-hardened sodium-silicate bonded shells had adequate strength and produced defect-free castings, but a considerable amount of mould distortion occurred on thicker sections, due to the rapid softening and melting of the silicate bond when molten steel entered the mould. The use of aluminium phosphate as a bond was also explored, but was rejected due to the large amounts required to produce a sufficiently strong shell. Measurements of the carbon pick-up at the surface of austenitic steel castings in resin-

FIG. 1.—*Log-washer adapted as a sand-reclamation plant. This laboratory-scale equipment handles about 6 cwt. per hour and has proved capable of reconditioning core and facing sands.*

bonded silica sand shell moulds showed that this was reduced by approximately 50 per cent. by an addition to the sand of manganese-dioxide.

Flowability of Moulding Sands

Research on the flowability of moulding sand has been sponsored by the Association in the Department of Refractories Technology at Sheffield University under the direction of Professor J. White. Its primary object is to throw light on the factors which influence the compaction of clay-bonded moulding sand. In the first place, a study is being made of the relationship between the plastic flow characteristics of the clay bond and the flowability of the sand.

The plastic flow characteristics of a British ball clay and of Wyoming bentonite have been measured with a capillary viscometer at different moisture contents. Ageing effects involving a change in the plastic flow characteristics with time have been measured for both clays and the significance of these properties in relation to the behaviour of moulding sands is now being studied in tests in which the flow properties of the clay-bonded sand are measured under conditions similar to those imposed by jolt moulding machines. The effect of alkali additions which cause dispersion of the clay and an increase of its fluidity is also being examined. More precise measurements of the rheological properties of the clay bonds are being made with a shearing plate viscometer.

CO_2/Sodium-silicate Process

The Association is collaborating with the North-East Coast Association of Steel Founders' Regional Technical Committee in a series of tests to investigate the collapsibility of CO_2/sodium-silicate sand mixes by hot-tearing tests. A standard form of hot-tear test-piece has been designed, and the foundries associated with this project, are carrying out foundry trials using moulds prepared under standard conditions of gassing time, standing time after gassing, etc. After successful preliminary trials, the effect of various silicate binders and additives on collapsibility and hot-tearing is now being examined.

In the laboratories a series of tests involving casting trials with a suitably-designed mould has been carried out to determine the effect of contamination of sand by used CO_2/sodium-silicate sand on the refractoriness of the sand and hence upon casting quality. The results have shown rather unexpectedly that the use of used CO_2/sodium-silicate sand does not lead to greatly increased sand "burn-on" but a much greater susceptibility to sand erosion and to "scabbing" defects. The work has resulted in a definition of the amount of alkali build-up in the sand, which can be tolerated without loss of casting quality. Work has also been completed on the effect of alginates in improving the bench life and lowering the retained strength of CO_2/silicate-bonded sand after heating in the range of temperature 200 to 1,200 deg. C. Tests are now in progress on the effects of other additives on these properties.

Kaolinitic Clays

Practical foundry trials of a bonding clay mixture in which Wyoming bentonite is partially replaced by a British ball clay have continued throughout the year and have now been in progress for 21 months. The clay mixture is still working quite satisfactorily and its use has resulted in a substantial economy in bond costs. To further more general use of this bond, the Association has obtained 5 tons of the clay mixture in pre-packaged form and has supplied quantities to 17 member foundries for their experimentation and comment.

Data Sheets on Moulding Sands

The examination of moulding sands has continued during the year. Supplementary data sheets have been issued to members and the accumulation of data on a further 16 sands will be completed in the near future.

Mould and Core-bonding Agents

An evaluation has been made of the suitability for core-bonding purposes of many of the various types of linseed oil that are available, to determine if they offer any advantages in speed of baking and bonding properties over the normally used raw oil. Tests are in hand on special British and German air-hardening oil binders for the bonding of moulds. It has been found that they have the

unusual property of developing good green-strengths with a suitable clay or natural-bonded sand addition and, moreover, air harden to some extent and develop adequate strength in the baked condition. Casting trials have been made to examine the surface finish of castings made in moulds bonded with these materials.

Metallurgy

Microporosity in Steel Castings

The object of this work has been to discover to what extent finely dispersed microporosity in steel castings was due to micro-shrinkage and to what extent it was due to the evolution of gas, both occurring in the last stages of solidification. An examination has been made of several keel-block castings made from air-melted carbon steel in comparison with castings of the same composition cast at the same temperature and into the same type of mould but melted in pure hydrogen, thoroughly degassed and poured under a low pressure of argon. The incidence of microporosity was determined by semi-microradiography of thin slices cut from the castings and by measurements of density and ductility of miniature tensile test-pieces, cut from suitable locations in the casting. Although the average density of the vacuum degassed steel was consistently higher than that of the air-melted steels, the tensile ductility of the vacuum-treated steel was only very slightly higher on average than that of the air-melted steel. Semi-microradiography has revealed that even the vacuum-treated steel castings are not free from microporosity and it has been concluded from this work that micro-shrinkage exercises a greater influence on the incidence of microporosity than does gas evolution.

For this reason, work on this project has been re-orientated and a closer study is to be made of the effect of feeding during solidification on the incidence of microporosity. Particular attention will be paid to the stage at which it may cause leakage in castings subjected to pressure tests and a study will be made of the influence of pressurized risers on the type and extent of microporosity.

Magnetic Properties of Cast Steel

Measurements have been made of the effects of small quantities of nickel, chromium, molybdenum, copper, tin, and lead, and larger quantities of manganese on the magnetic properties of cast 0.1 per cent. carbon steel. In general, the addition of all these elements (except copper) impairs the magnetic properties. Copper in quantities up to 0.35 per cent. has virtually no effect. Some evidence has been obtained that the gas content may have a significant effect on the magnetic properties and a further investigation is in hand on this point. The effect of small quantities of carbide-forming elements, *e.g.*, titanium and zirconium, is also under examination.

The Association's thanks are due to Edgar Allen & Company, Limited, for the provision of facilities for the magnetic measurements.

Influence of Rare-earth Additions and Complex Deoxidants on Properties of Cast Steel

This project has recently been commenced and techniques have been worked out for the introduction of highly reactive deoxidants to the molten steel. The work is being carried out on split heats made in the graphite-resistor-rod furnace and the properties being measured include the impact strength at room and at sub-zero temperatures.

Heat-treatment of Cast Steel

The purpose of this project is to determine the influence of heat-treatment on the mechanical properties of carbon, low- and medium-alloy steels of varying sectional thicknesses with a view to obtaining optimum properties with maximum furnace economy. The preliminary work which has now been completed has been concerned with the development of suitable test castings of 1-in., 3-in. and 5-in. sections from which test-pieces can be removed, and the determination of the heating rate at the centres of typical blocks in the gas-fired and electric furnaces, which will be employed in this work.

Plant Engineering

Sand Reclamation

Trials have been carried out with a dry pneumatic sand-reclamation pilot-plant. Samples of

FIG. 2.—*Fettling bench designed by the BSCRA to provide a local exhaust system of maximum efficiency combined with optimum conditions for noise abatement.*

British Steel Castings Research Association

sand, scrubbed for various periods of time, were examined for cleanliness, size grading and bonding properties, and test castings were made in moulds made from these sand samples. These trials showed that, provided the sand was scrubbed for a sufficient period of time, it was satisfactory for normal mould facing mixes but it was not clean enough for general core purposes.

Trials are now in hand with wet-cleaning methods and a pilot-scale log-washing plant (Fig. 1) has been constructed in the Association's laboratories. Preliminary trials have been extremely promising and waste sand containing 6.2 per cent. clay has been successfully processed in one treatment to produce sand containing only 0.19 per cent. more clay than new Chelford medium silica sand. Satisfactory castings comparable with those made in new sand can be made with sand reclaimed in this way. Further work is now in hand on tonnage batches of sand to determine the optimum conditions of plant operation.

The Association is grateful to August's, Limited, for providing facilities for trials with the dry pneumatic scrubber.

Moulding-sand Compaction and Moulding Machines

A careful series of measurements has been made of the mould compaction at various points in moulds made from a standard pattern on three types of jolt/squeeze moulding machine under various conditions of operation of the machines. This work has been extended to include a determination of the effect of variation of the properties and composition of the sand mixtures and test castings are being made to relate the degree of compaction with the surface quality of the castings. The Association's thanks are due to the Osborn Foundry & Engineering Company, Limited, for the provision of facilities and to the British Moulding Machine Company, Limited, and to Hadfields, Limited, for the loan of moulding machines, which have been installed in the Research Station for this investigation.

Efficiency of Shotblasting

A review of previous work on this subject has been completed and 30 samples of abrasive shot from various sources are being examined for particle size, soundness, hardness, microstructure, chemical composition, density and shape. A machine has been designed and is being constructed, which will measure the cleaning efficiency, the rate of breakdown of the abrasive and the wear produced on impellers and other parts of shotblasting equipment.

Chemical Methods of Cleaning Castings

An investigation has been made of a proprietary process involving electrolysis in a molten alkaline salt bath for the removal of adhering sand from steel castings. Although the process effectively removed the sand, the surface of the casting would still require dressing, since probes of metal penetrating the sand were not removed. The process might, however, have limited uses for the cleaning of complicated internal cavities in castings, where mechanical cleaning is difficult or impossible.

Industrial Health

Assessment of Atmospheric Dust in Steel Foundries

The Association has completed dust measurements, normally over a period of three successive days, in the dressing shops of 58 member-firms. Reports have been issued to members participating in this survey giving the average dust-concentration and the quartz content of the dust. The latter is determined by X-ray diffraction. Over 300 dust samples have been checked for quartz content by this method during the year.

The results of this survey are being assessed and correlations are being sought between dust concentration, work load, volume of shops, general ventilation standards, etc. Determinations are in hand of the characteristics of the dust produced by individual foundry processes and the contribution which they make to the overall dust-concentration in foundries. In many cases, the result of these measurements has enabled the sources of high dust-concentration to be identified and advice to be given on methods for minimizing its occurrence.

Efficiency of Dust Collectors

Data sheets on commercially available types of dust collector have been prepared and are being issued to members in loose-leaf form. Equipment has been constructed for the sampling of dust in ducts and for the analysis of the particle size distribution in the dust by sedimentation techniques. Tests are being made on a new type of air filter imported from South Africa, which is claimed to show a high efficiency on a dust and fume particle size less than 1μ. A pilot plant has been constructed to enable this filter to be tested on the fume generated during oxygen injection in the Association's 6-cwt. steelmaking furnace.

Dust Control on Portable Fettling Tools

The Association's staff have maintained contact and have co-operated with member-firms in tests on local exhaust systems applied to dust control on pneumatic chisels and grinders. Dust measurements and cinematograph film records have been made. Tests have also been made on a new type of exhausting fettling bench, which is commercially available, and an experimental fettling bench which incorporates special features for both dust and noise control (Fig. 2) has been constructed in the Research Station.

Noise Abatement in Foundries

Measurements of noise pressure level and of the frequency distribution of noise have been made in member foundries and measurements on individual tools have been made at the Research Station. Experiments are in hand on the development of muffles and silencers for the exhaust from pneumatic fettling tools, which are combined with measurements of effect of these devices on the

efficiency of the tools. This work has been extended to study the isolation of noisy operations by sound-absorbent screens. This includes a study of the transmission losses through various insulation materials, the effect of barrier heights, etc.

Silicosis Hazards in Steelfoundries

Silicosis research carried out at Reading University by Dr. P. F. Holt is financially supported jointly by the Association and I.C.I., Limited. The present investigation is concerned with the relative fibrogenic activity of dusts generated from normal clay-bonded moulding sand and from CO_2/sodium-silicate bonded sand. Preliminary experiments with rats as subjects to determine dosage rates, exposure times, etc., for the development of silicosis have been completed. On the basis of these experiments larger batches of rats are now being exposed, killed at intervals and examined, and it is expected that conclusive evidence on the relative toxicity of these dusts will emerge in a few months' time.

* * * * * *

The report was signed on behalf of the Council by Mr. C. H. Kain, chairman, and Dr. A. H. Sully, director of research.

Fluidized Magnetic Conversion of Iron Ore

As high-grade iron-ore reserves in Michigan and Minnesota are being rapidly depleted, attention has been directed to devising an efficient and economic system to beneficiate low-grade ore to make it suitable for conventional blast-surface techniques. The low-grade ores in question, called taconite in Minnesota and jasper in Michigan, can generally be divided into two groups, magnetites and hematites. The former can be concentrated by straight magnetic separation practised on a commercial scale at the Reserve Mining Company and Erie Mining Company plants.

Unfortunately, however, the majority of the low-grade ores are not magnetic and must be treated in some other manner. Two basic processes have been developed so far, one being flotation, the other method of treatment involving conversion of hematite to magnetite which can then be magnetically concentrated. This can be carried out by contacting the ores with a suitable reducing gas at the proper temperature. An article to describe the role of fluidization and the fluidized bed technique in accomplishing this conversion in conjunction with the "Dorrco Fluosolids" iron-ore conversion system was contributed by Robert J. Priestly to "Blast Furnace and Steel Plant," March, 1958*.

* See also *Iron & Coal Trades Review* July 18, 1955

AGA HEAT, LIMITED, 20, North Audley Street, London, W.1, announce that they have placed on the market a new Agathermic cooker and water-heater. It is an adjustable, thermostatically controlled, fully insulated cooker and water-heater, combining flexibility with the superfine cooking qualities and the economies for which the name of Aga has earned a high reputation.

Post-graduate Short Courses

The Department of Metallurgy, College of Technology, Gosta Green, Birmingham, proposes to offer the following two post-graduate courses during the autumn term, commencing in October, 1958:—(1) Metallurgy of nuclear-power materials and (2) Spectrographic and chemico-physical analytical techniques for metallic materials.

The course on nuclear-power materials is intended for technical staff engaged in research and development on nuclear reactors, and for students proceeding to advanced metallurgy examinations. During the 10 lectures, which will be given on successive Tuesday evenings, commencing on October 7, extraction, fabrication and physical properties of the fissile metals and of those non-fissile metals of special interest in reactor technology will be dealt with, together with the effects of radiation. The development of fuel elements and canning materials will be reviewed, as will the metallurgy of reactor structural work.

The second course is intended for metallurgists and chemists engaged in research and development work. Subjects to be dealt with include spectroscopy and its application to both ferrous and non-ferrous alloys, polarography, absorptiometry, and the established electro-chemical methods. The course will consist of 12 lectures held on successive Wednesday evenings, commencing on October 8. The fee for each course will be £2 2s. and full details of each programme, and application forms, can be obtained from the Department at the address quoted.

Industrial Relations

Mr. Tom Shanks, managing director of Denny Iron Works, speaking recently to members of the Denny Rotary Club, said that the common aim was to combine the interests of capital and labour to the mutual benefit of both and of the community at large. To-day the employers' federations and the unions understood each other well and sought to find mutual agreement; which left no hard feelings on either side. This was achieved much more successfully than in the past. To-day the set-up was clearly defined; only when there was a breakdown in negotiations did a dispute arise. Mr. Shanks explained the various Acts of Parliament which affected the relationship between employer and employee and said the negotiating machinery was improving rapidly and progressively and was likely to show further advancements in the next three or four years. In one form of dispute, however, there was still a great problem to be solved. Changes in materials and techniques often resulted in disagreement between different unions. Both sides of industry were anxiously trying to find a solution.

Iron-age Hoard Discovered

A hoard of iron objects believed to date from around 150 B.C., was unearthed at Madmarston Hill, Swalcliffe, north Oxfordshire, by a team of Oxford University archaeologists after preliminary surveys had been made with a new highly-sensitive magnetic device.

Under the direction of Dr. P. J. Fowler, the team brought up, *inter alia*, 10 "currency" bars over 3 ft. long, an axe head, and two horse bits. It is not yet known whether the iron is from the Forest of Dean or north Oxfordshire.

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Ironmaster's Wager

In the year 1803, Richard Trevithick came to Penydarren near Merthyr Tydvil to make steam engines for Samuel Homfray, ironmaster of that place. Homfray's great rival was the famous Richard Crawshay who owned the growing Merthyr Ironworks and had been the prime mover in building a canal from Merthyr to Cardiff which was called the Glamorgan Canal. This was completed in 1791 and it had almost a monopoly in carrying iron from the smelting and processing area of Merthyr and Dowlais to the port at Cardiff. Coal also made its way along this canal which Richard Crawshay dominated.

Samuel Homfray planned to build a horse-drawn tramway along the Taff Valley to compete in freights with the Glamorgan Canal. Although this project was never completed by him, he did construct nine miles of tram-road to link up his works at Penydarren with the canal as far down the valley as Quakers' Yard. It was for this tramway that Richard Trevithick the Cornish steam engineer built for Homfray the first locomotive ever to run on rails.

This engine was an unusual piece of machinery. Trevithick used high-pressure steam contrary to the practice persisted in by James Watt, who used low-pressure steam. The locomotive had vertical cylinders fixed to a high framework and its stack was crudely built of brick. But it worked, and Homfray became so interested that he wagered with Richard Crawshay one thousand guineas that the locomotive would take ten tons of iron and seventy people from Penydarren to Quakers' Yard. Crawshay, who was anxious to discourage this possible rival to his canal, accepted the challenge and the test was planned to take place on February 21, 1804.

Watched by large crowds, the quaint locomotive began its journey from Penydarren. Except for a small delay on the way when a low bridge knocked off the top of the brick chimney stack, the outward journey was completed successfully in a little over an hour and a half and Trevithick thus won for his employer one thousand guineas.

But the return journey against the gradient and around badly designed curves was less successful and the locomotive ended its career as a stationary pumping engine. Homfray did not appreciate the significance of what had been achieved. Trevithick left for other scenes, disappointed that he could not develop his ideas further at Penydarren. So that it was to George Stephenson and the north of England and not to Trevithick and South Wales came the fame for the development started ten years later, of the railway engine. If Trevithick had worked for Crawshay and not for Homfray, the story might have been very different.

ORDERS TOTALLING £70,000, for the new Bennes-Marrel multi-bucket hydraulic lifting and haulage units—including one for the supply of a fleet to the Steel Company of Wales, Limited—are announced by Aero Maintenance Equipment, Limited, one of the Arusha group of companies.

"Nationalization should be opposed"

"Nationalization should be opposed by all who enjoy the freedom our predecessors strove so hard to secure," said Mr. N. C. Macdiarmid, managing director of Stanton Ironworks Company, Limited, in a speech to Ilkeston Rotary Club recently. He added that state acquisition of the iron and steel industry would inevitably lead to state control of significant sectors of the engineering, chemical and other industries. "Apart from any consideration of politics, I am convinced that an extension of state control over the major industries of the country leads inevitably on a rake's progress towards Communism of the pattern that we can see in Soviet Russia," he said. We may now be on the threshold of another constitutional crisis in which Parliament, in the name of the people, may make such inroads on the rights and freedom of the individual that the trend of centuries may be reversed. I do not believe that the people want such a reversal, he added. An advantage claimed for State ownership of industry was that funds for capital development and modernization were available without limit. On this point, he said that, initially, the requirements of nationalized industry were to have been met by public loans—but spending was too fast and in 1956 the Government decreed that new money should come from the Treasury. "In 1957, the Treasury lent nationalized industries £284,000,000 and aggregate borrowing for the Central Electricity Authority and the Gas Council up to March 1957 was £1,335,000. These sums had been found from the public purse and from the general fund of taxation," he said.

Mr. Macdiarmid emphasized that his comments should be interpreted not in a political but in an economic meaning, saying, "It is of desperate importance to the future generation and to the traditional freedoms of society in the British way of life that the issues of State control and competitive enterprise should be weighed with reason and objectivity."

The iron and steel industry, said Mr. Macdiarmid, was confident of its ability to hold its own against Continental competition. European Free Trade proposals held prospects of expansion and opportunity welcomed by the industry as a "stimulating challenge to the companies and to the industry's central organization." One of the failings of the industry, however, was that it had not projected itself properly into the community—"it had hidden its light under a bushel."

Swan, Hunter's Modernization

At the launch of the 32,500-ton tanker Varicella from the Wallsend yard of Swan, Hunter, & Wigham Richardson, Limited, Mr. E. J. Hunter, chairman of the company, announced that the building of the ship, from keel-laying to launching, had taken only seven months, a record for Britain and an improvement of 40 per cent. on Swan, Hunter's previous best. He attributed this to the firm's extensive modernization scheme, especially as to the wide use of prefabrication facilities.

Mr. A. S. C. Hulton, managing director of Shell Tankers, Limited, owners of the new ship, said that the free world's oil consumption had doubled during the past 10 years and he believed it would double again in the next 10 years. More ships would be needed to carry this extra oil, and shipbuilders who had wisely spent money on modernization would be in a position to get business when ships were needed.

Business Names

By Lord Meston

The Registration of Business Names Act, 1916, as amended by the Companies Act, 1947, renders it unlawful to carry on a business without registration under a name which is not that of the individual who owns the business. This applies not only to aliens but to all persons who engage in business. The term "business name" includes "Profession," and "firm" means an unincorporated partnership carrying on business for profit. Registration must be effected by every individual, firm, or company who or which carries on business in the United Kingdom under a business name which does not consist of:—(*a*) in the case of an individual, his true surname without any addition other than his true Christian names, or the initials thereof; (*b*) in the case of a firm, the true surnames of all individual partners and the corporate names of all partners who are corporations without any addition other than the true Christian names or initials of the individual partners; (*c*) in the case of a company, its corporate without any addition.

Further, registration must be effected by any individual or firm having a place of business in the United Kingdom, who, or a member of which, has changed his name. But registration is not required merely because of a change of name if:—(*a*) the name has been changed or disused before the person bearing the name had attained the age of 18 years, or (*b*) the name had been changed or disused for a period of not less than 20 years, or (*c*) the change is merely that of the case of a woman having changed her name in consequence of marriage. If, however, a married woman trades or continues to trade under her maiden name registration is necessary.

Every firm or person required to register should apply to the Registrar of Business Names, Bush House (S.W. Wing), Strand, London, W.C.2. Registration must be effected within 14 days after commencement of business in the registrable business name. The necessary forms and the copies of the Acts above-mentioned may be purchased from H.M. Stationery Office, Kingsway, London, W.C.2, and other addresses, or through most booksellers.

Further Pointers

The following notes are given for the guidance of founders, though they are in no way exhaustive. (*a*) A name will not be allowed if it is misleading; for example, if the name suggests that a small concern is trading on a great scale or over a wide field. (*b*) Names cannot ordinarily be allowed which suggest connection with the Crown or members of the Royal Family, or suggest royal patronage (including names containing such words as "Royal," "Queen," "Princess," "Crown"). (*c*) Names cannot ordinarily be allowed if they suggest connection with a Government Department, or any municipality or other local authority, or any society or body incorporated by Royal Charter or by Statute, or with the Government or any part of the Commonwealth, or of any foreign country. (*d*) "British" is not ordinarily allowed in a business name unless the business is of substantial size and importance in its particular field; its use is prohibited where the business is not wholly or mainly under British ownership or control. (*e*) Only in exceptional circumstances and for valid reasons will names be allowed including any of the following words: "Imperial," "Commonwealth," "National," "International," "Corporation." (*f*) Names must not include the word "Co-operative" or the words "Building Society." (*g*) Names including the following will be allowed only where the circumstances justify it: "Bank," "Banking," "Investment Trust," "Trust." (*h*) Names which include a surname which is not the surname of the proprietor(s) will not be allowed except for valid reasons. (*i*) If the proposed name includes a registered trade mark, the consent of the owner of the trade mark should be produced to the Registrar.

If a trader is in doubt about the acceptability for registration of a proposed business name, he would be well advised to ask the Registrar's agreement before incurring any expenditure on the printing of business stationery, signwriting, and so on. It is an offence to commence or carry on business under a business name which the Registrar has refused to accept for registration.

Necessary Machinery

Registration is a matter of necessary machinery. It does not in itself confer any exclusive or proprietary rights in a business name; neither does it give any protection against duplication or against registration of an identical or similar name whether as a business name or a company name. A special word is required about the position of companies. The registration of a business name does not imply subsequent acceptance of the same name as a company name, this being a separate matter for reference to the Registrar of Companies, Companies Registration Office, Bush House (S.W. Wing), Strand, London, W.C.2. It may be noted that the Board of Trade have power to refuse a company to register a name which is "too like" that of another company already upon the Register.

Any person aggrieved by a decision of the Registrar to refuse to register a business name may appeal to the Board of Trade within 21 days of the Registrar's decision. All changes in any of the particulars already registered must be notified to the Registrar on the prescribed form, within 14 days after such a change, or such longer period, as the Board of Trade may, on application, allow.

Business Names

Default in Registration

Default in registration is a serious matter. It is an offence in cases where the Act requires registration to fail to register in the manner directed. If any particulars required to be furnished by the Act whether for an original registration or of any changes are not so furnished without reasonable excuse within the time specified, the person or persons in default are liable on summary conviction to a penalty not exceeding £5 a day for every day during which the default continues.

The rights of any defaulter arising out of any contract entered into by him in relation to the business in respect of which registration is required shall not be enforceable while he is in default by action or other legal proceeding either in the business name or otherwise. Thus, if Mr. W. Jones, purporting to trade as "Smith & Company" has failed to register under the name of "Smith & Company," but has sold goods under that name, then neither "Mr. W. Jones" nor "Smith & Company" are able to sue for the price of those goods so long as the default in registration continues.

It is, however, expressly provided that the Court may, on application, give relief against this civil disability. The Court may grant relief where it is "just and equitable to grant relief." By way of example, an actual case may be cited where certain traders were not aware of the Registration of Business Names Act, 1916, or that it was necessary for them to be registered under it. It was found as a fact that the other party was not misled by the traders' failure to register, and the other party knew that the traders in question were the proprietors of the business with whom he was dealing. It was held that the case was one in which it was "just and equitable to grant relief" and the Court granted the traders relief accordingly. The real question in these cases is whether the person in default has acted throughout in good faith. If the answer is in the affirmative then the Court is likely to grant relief.

Stationery

In connection with stationery of all kinds, attention is visibly drawn to the requirements of the Act. It is provided that:—Every individual and firm required by this Act to be registered shall mention in legible characters in all trade catalogues, trade circulars, showcards and business letters on or in which the "business name" appears and which are issued or sent to any person in any part of Her Majesty's dominions:

(*a*) in the case of an individual, his present Christian name or the initials thereof and present surname, and any former Christian name or surname used after attaining the age of 18 years or during the past 20 years and his nationality if not British;

(*b*) in the case of a firm, the present Christian names or the initials thereof and present surnames, any former Christian names and surnames used after attaining the age of 18 years or during the past 20 years and the nationality if not British, of all the partners in the firm, or in the case of a corporation being a partner, the corporate name.

A penalty not exceeding £5 may be imposed upon any individual or on every member of a firm in default. In the case of a company, incorporated under the Companies Acts, which has registered a "business name" under the Registration of Business Names Act, 1916, the company remains subject to the requirements of the Companies Act, 1948, *viz:* to have its name mentioned in legible characters in all business letters, notices, and other official publications, etc., of the company; also to show in respect of each of its directors (unless the company was incorporated before November 23, 1916, or has been specially exempted by the Board of Trade) the same particulars, in the same documents, as is required for the partners of a firm.

A penalty not exceeding £50 may be imposed upon a company in default, and not exceeding £5 upon every officer of the company in default. If any firm, individual or company registered under the Act ceases to carry on business, then the existing partners of the firm, or the individual (or, if deceased, his personal representative) or the directors or any liquidator of the company should notify the Registrar within three months of any such cessation. A penalty not exceeding £20 may be imposed upon any person whose duty it is to notify the Registrar within the specified period and who fails to do so.

DSIR Committees

In order to obtain a closer link between the actual work of research done in the department of Scientific and Industrial Research and the hitherto somewhat remote top-level control of the Council for Scientific and Industrial Research, a change in organization is to take place which will affect two DSIR laboratories. Small steering committees are being set up to bear responsibility for the research programmes at the new Warren Spring Laboratory, Stevenage, and at the recently renamed National Chemical Laboratory, Teddington.

In addition to the chairmen who are members of the Council, there will be four members on each committee. Two will be from industry and will have experience in research management. The other two members will be the secretary of the DSIR and the director of the laboratory. The committees are empowered to set up specialist sub-committees as necessary to advise on the fields of research covered by the laboratories.

To head the Warren Spring Committee is Sir Harry Jephcott, chairman of Glaxco Laboratories, Limited, and a director of the Metal Box Company, Limited, and the Murphy Chemical Company, Limited. Members from industry supporting him will be Dr. R. Holroyd, deputy chairman of Imperial Chemical Industries, Limited, and Mr. D. A. Oliver, director of research of the B.S.A. Group Research Centre.

The National Chemical Laboratory committee, which will assume responsibility from October 1, will have, as chairman, Professor C. E. H. Bawn, who has been Grant-Brunner Professor of Inorganic and Physical Chemistry at Liverpool University since 1948. His "industrial" members are Dr. Frank Roffey, research and personnel director of the Distillers Company, Limited, and Mr. Bryan Topley, a director of Albright & Wilson, Limited.

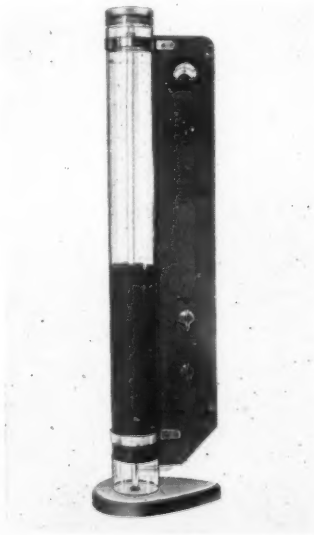
Equipment and Supplies

Water De-ionizer

Water having a specific resistance within the range 3·15 × 10^6 ohms is finding an increasing application not only in the laboratory but also in industry, where such water is used in the preparation of pure chemicals and in the washing of components subsequent to treatment with acids and other electrolytes. Water produced by simple distillation almost invariably contains significant traces of metal ions, dissolved carbon dioxide and silica and has a pH value which is always less than 7 and often as low as 5.9. Three or more distillations in glass are needed to produce what is known as "conductivity water" and even then such water has an acid reaction due to the difficulty of eliminating final traces of carbon dioxide and ions derived from the material of the still.

The removal of ionic impurities by adsorption on mixed cation and anion exchange resins provides the best possible solution to this important problem and this method is widely used in large-scale processes. Unfortunately, strongly basic type 1 resins tend to coalesce when mixed with strongly acidic resins containing sulphonic acid groups and while type 2 resins exhibit this property to a markedly lesser extent, the quality of the effluent produced by them is inferior to that made with type 1 resins. As a result of this tendency, mixed-bed laboratory de-ionizers have been based in the past upon exchangeable cartridges which could be replaced on exhaustion, and while this method gives satisfactory results it is one which necessarily proves expensive. The Griffin-Raleigh water de-ionizer (Fig. 1) supplied by Griffin & George Limited, of Ealing Road, Alperton, Wembley, Middlesex, makes use of a new process enabling mixing and reclassification of the resins to be carried out in columns down to 3-in. dia., thus making it simpler to regenerate the resins *in situ*.

FIG. 1.—*New type of water de-ionizer marketed by Griffin & George, Limited.*



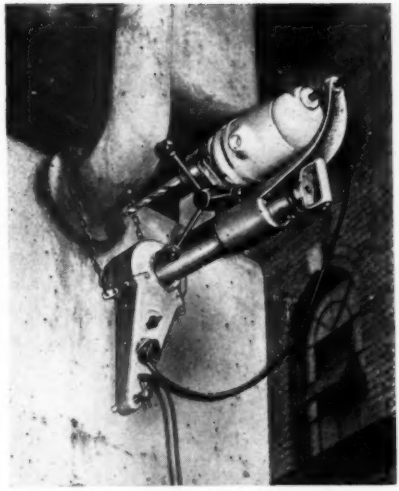


FIG. 2.—*H. & S. electro-magnetic drill stand (Type FP6) in position for drilling a ¾-in. hole in a pipe flange. Setting up time is given as two min.*

The de-ionizer is supplied ready for use in two sizes giving 16 and 64 galls. of very pure water per regeneration respectively, and the price of these units compares favourably with that of the older replaceable cartridge types. Using mains water-flow rates of 5 and 20 gal. per hr. may be employed with an effluent conductivity of 0.2 micromho. Using an influent either single distilled or two-bed de-ionized water the effluent conductivity may approach 0.05 micromho and an inter-regeneration capacity of several thousand gallons is realized.

Electro-magnetic Drill-stands

Wolf Electric Tools, Limited, Pioneer Works, Hanger Lane, W.5, have introduced two new types of electro-magnetic drill-stands which follow general precision-drill press lines as regards column and headstock, but the base is of special design and construction to house the built-in magnets (Fig. 2). These are centred directly underneath the column and are controlled by a protective two-stage switch alongside. This provides a "hold" value for accurate positioning of the equipment over the point of drilling before the operation is commenced. The switch is then advanced to the "drill" position; the magnets become fully energized and the tool is brought into circuit with the line voltage.

JELTEK, LIMITED (formerly the "Jeltek" division of J. E. Lesser & Sons, Limited), announce the introduction of a new addition to their range of donkey jackets. Called the "Leatherjac," the basic garment is manufactured from 30-oz. blue melton, has a Prussian storm collar, and is fitted with four buttons and two outside patch pockets. A chrome-leather reinforcement covers the whole of the sleeves, the full length of the back, and over the shoulders to 6-in. down the front. This new garment offers considerable resistance to abrasion and hard usage, making it suitable for outdoor workers handling coke, pig-iron, scrap, and other materials, it is stated.

Equipment & Supplies

Saw-bench

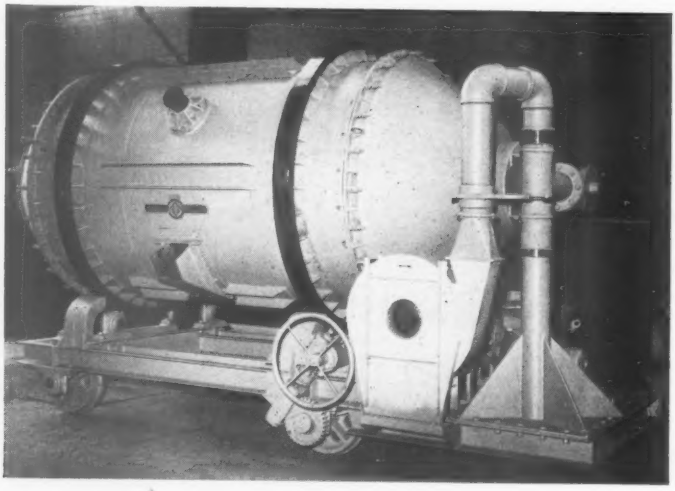
The latest addition to the "Bursgreen" range of woodworking machinery manufactured by Wadkin Limited, Green Lane Works, Leicester, is the 10-in. tilting arbor saw-bench model A.G.S. which has a maximum depth of cut of 3⅛ in. with its 10-in. saw, and will cut to the centre of a panel 50-in. wide (Fig. 3). The table, which is a heavily-ribbed casting, surface ground for accuracy, has a surface of almost eight sq. ft., which is ideal for supporting large plywood or plastic sheets. In addition, a special extension with adjustable platform and floor supports is avaliable which can be fitted on either side of the machine, which increases the capacity to 48 in. from saw to guide plate.

The main body of the machine is a one-piece casting which is mounted on a heavy-gauge fabricated-steel sub-base. The saw cants to 45 deg. by conveniently placed handwheel in front of the machine. In addition the saw rises and falls also by screw movement actuated by handwheel. On both saw movements rigid locks are provided. The saw-guard and riving-knife automatically cant with the saw and give full protection. Although extremely rigid they can be easily removed and replaced before and after moulding operations. The saw spindle itself is accurately ground, fitted with large saw flanges and mounted on sealed-for-life ball bearings. The drive from motor to saw spindle is by three short centre vee-belts with suitable adjustment for tensioning. The fence extends the full width of the machine and moves on front and rear precision-ground circular-section guide-bars. Rapid or micro adjustment is provided. A single lever-operated cam lock with exclusive alignment features secures the fence to the front and rear bars in one movement. The fence movement to the right of the saw is 25½ in. and 15½ in. to the left of the saw. There is a mitre gauge which is used in a groove in the table surface on either side of the saw for cross-cutting, mitring and compound angle sawing. The gauge is provided with a built-in cutting-off gauge for repetition work. Large-scale production of this saw-bench has been commenced at the Bursgreen, Durham, factory.

FIG. 3.—*Wadkin saw bench with a working surface of nearly 8 sq. ft.*

ALBRIGHT & WILSON (MANUFACTURING), LIMITED, 1, Knightsbridge Green, London, S.W.1, are marketing a new process for bright nickel plating. Albright & Wilson have applied for registration of the name "Plus-brite," for the new process. The process combines with a fully bright finish better physical properties of the plate than have hitherto been available in this country. It offers considerable markets in the motor vehicle industry, for example for the plating of a whole range of accessories such as bumpers and over-riders requiring a high standard of brightness and service-ability. The process should also find many uses in the plating and electrical appliances, steel pressings, forgings and zinc-based die-castings, as well as brass and copper parts.

THE PLASTICS PACKAGING division of Gordon & Gotch, Limited, 75-79, Farringdon Street, London, E.C.4, has marketed a new-type blacklead pencil which writes on plastic, china, glass, and all glazed surfaces. Of particular value for identification in factory production lines, warehouses, and retail outlets, the Swan "All-Stabilo" pencil overcomes the cost and labour problems of writing on difficult surfaces.



Mobile Rotary Furnace

The accompanying illustration shows a rotary melting furnace for the first time constructed as a self-contained mobile unit by Monometer Manufacturing Company, Limited, 115-116 Strand, London, W.C.2. It is a 3-ton capacity fully-mechanized unit mounted on four-wheel bogie and was recently delivered to the order of Birmingham Battery & Metal Company, Limited, of Selly Oak, Birmingham, for the melting of non-ferrous metals.

FOLLOWING an approach to the American subsidiary of Baker Perkins, Limited, the Peterborough manufacturing engineers, a merger has been effected between Baker Perkins Incorporated, of Saginaw (Michigan), and the Petersen Oven Company, of Franklin Park, Chicago.

News in Brief

THE AUTUMN CONGRESS of the *Bureau International de la Récupération* is to be held on October 29 and 30 in Paris.

MIRRLEES WATSON COMPANY, LIMITED, engineers and ironfounders, etc., of Glasgow, has purchased Pott Cassels & Williamson, the Glasgow chemical plant, sugar machinery, and centrifugal machinery manufacturers.

RUSTON-BUCYRUS, LIMITED, excavator specialists of Lincoln, announces that the new address of its north-eastern area supervisor, Mr. W. Alexander, is 75, Oakdale, Harrogate, Yorks (telephone: Harrogate 69287).

AVERAGE SELLING PRICES for the month of June (calculated to the nearest 10s.) of members of the Association of Light Alloy Refiners and Smelters were:—LM1, £145 10s. per ton; LM2, £155 10s.; LM4, £173 10s.; LM6, £190.

HAVING OBTAINED various large orders, John Fowler & Company (Leeds), Limited, diesel crawler tractors and diesel locomotive manufacturers, has restored full-time working at its engineering works at Sprotborough (Yorks), following the introduction of a four-day week some time ago.

THE NEW £2,000,000 plant installed by the Scottish Gas Board in its modernization scheme at Provan gasworks was inaugurated last Monday by the Lord Provost of Glasgow, Mr. Myer Galpern. Delivering 40,000,000 cub. ft. a day, the works will be the largest producer and distributor of gas in Scotland.

FLEISCHMANN (LONDON), LIMITED, of Chancery House, Chancery Lane, W.C.2, have been appointed sole authorized agents and distributors for the United Kingdom of all quartz products manufactured by Heraeus Quarzschmelze G.m.b.H., Hanau, Western Germany, with the exception of optical quartz.

BIRLEC, LIMITED, announce that owing to the increasing demand for Birlec standard furnaces, a separate division to handle solely this type of work has been created. Known as the standard furnace division, it is managed by Mr. John Penfold, previously furnace department manager of the Morgan Crucible Company, Limited.

THE *Associazione Italiana di Metallurgia* is honouring the memory of Federico Giolitti, the world famous metallurgist, by the periodic award of a steel medal. The first will be presented at the forthcoming annual general meeting of the *association*, to be held in Turin from September 21 to 24. An interesting programme has been arranged and details of it can be had by writing to the secretary of the *Associazione* at 16, Via Moscova, Milan.

CLAIMED TO BE AMONGST THE HEAVIEST iron castings of its type ever made in the Midlands, a 50-ton forging-machine base on July 30 left the Oldbury firm of Hunt Bros., Limited. The value of the iron alone is £1,000 and the order took five months to complete from making the pattern to machining. The casting needed 45 days before it was cool enough to machine. It was delivered to British Stampings, Limited, Wolverhampton Road, Oldbury.

IN VIEW OF an expansion programme, which will mean an output of 2,000,000 tons of ingots per year, now being completed at the Tisco works of the Tata Iron and Steel Company in Jamshedpur, India, Indian Oxygen, Limited, is planning an increase in both oxygen and acetylene capacity locally to meet the heavier demands which are expected to come from the steelworks and from associated industries in Jamshedpur.

G. & J. WEIR, LIMITED, engineers, Glasgow, who have already supplied plant for the production of three-quarters of the world's total output of fresh water from sea water, have obtained a contract from Guernsey Water Board for equipment to supply 500,000 gal. of fresh water daily. The plant, to be completed early in 1960, will take the form of a fabricated mild steel structure 7-ft. long, 19-ft. wide and 19-ft. high, internally divided into "flash" and preheater sections.

Book Review

Casting of Cellini's Perseus (in Italian); by G. Somigli; published by Associazione Italiana di Metallurgia—Milan, 1958, Via Moscova, Milan (price not given).

Countless visitors to Florence have seen and admired the beautiful Piazza della Signoria, the mobile proportions and splendid symmetry of the Palazzo Vecchio and the graceful lines of the Loggia dei Lanzi. Many will have stopped a moment to admire the statues at the Signoria and in the Loggia where the great bronze Perseus will have caught their attention. Perseus the bronze masterpiece of the sixteenth century, the brave demi-god born of Jupiter's illicit love for Danae holds up Medusa's severed head by the snakey hair. He looks away lest he be turned to stone by her gaze.

Some will have heard of the great Benvenuto Cellini, goldsmith, jeweller, genius, knave and rogue, favoured guest of the Courts of Florence, Rome and François I of France, the master sculptor of the famous Perseus. All his life Benvenuto Cellini aspired to be known to the world and to posterity as a sculptor and not as a goldsmith. When he returned to France from his stay with François he persuaded Duke Cosimo I of Florence to sponsor a large bronze statue. The statue was to be the masterpiece of the Signoria, a tribute to the greatness of the Duke and a vindication of Cellini—thereafter he would be known as "the sculptor."

Dr. Somigli's booklet on the casting of Cellini's Perseus gives many fascinating facts relating the day-to-day progress of the master in marshalling his raw materials, modelling his wax, and working his mould. It tells of the agony Cellini went through when in the last stages of casting he found that his bronze was too stiff and would not flow; of how in desperation he threw his fine English pewter plates into the molten metal which gave to the alloy the requisite quantity of lead and tin for the fluidity he wanted.

History relates that Cellini charged Duke Cosimo with the cost of his English pewter plates. But many, including Goethe, were convinced that this was yet another example of his roguishness. Cellini could not really have thrown his plates into the molten metal. Four hundred years have passed. Perseus was moved to a safe place during world war II. After, a department of the Ministry of Works in Italy sponsored the cleaning of the statue and Dr. Guglielmo Somigli was able to prove conclusively by analysis of the bronze that Benvenuto Cellini had in fact shown remarkable presence of mind by throwing into the fire his fine English plates and so saved his masterpiece from destruction. All who are interested in the history of metals, the Renaissance, Florence and sculpture, will be delighted with the brilliantly illustrated little booklet.

M. D. J. Busby.

One of the twelve illustrations shows that the back of the head of Perseus carries a stylized portrait of Cellini.—Editor.

Metallurgical Abstracts

Stainless-steel Castings with Unusual Hot-strength. C. TYIKA. ("Materials in Design Engineering." 1958. Vol. 47; No. 3; pp. 104-5). Cast stainless-steel valves and fittings for high-pressure, high-temperature applications are available on a production basis. These cast parts, produced from low-carbon 18-8 stainless steel, have exceptionally high mechanical properties. To ensure conformance with specifications, all castings are tested by dye penetrant and X-ray methods.

Each valve or fitting is tested hydrostatically at room temperature to a pressure of 6,000 lb. per sq. in. At room temperature, yield and tensile strengths range as much as 33 per cent. higher than specification requirements, and elongation and reduction of area range up to 50 per cent. higher than specified. The code requires a minimum yield strength of 18,300 lb. per sq. in., and a minimum tensile strength of 51,000 lb. per sq. in. at 354 deg. C. The most serious problem involved in obtaining these high mechanical properties is attaining castings meeting the porosity and internal shrinkage requirements.

When stainless steel solidifies after casting it undergoes 6 to 7 per cent. volumetric shrinkage. As metal is drawn from the liquid areas to fill the resulting shrinkage voids, the final area affected is the centre of the casting where a shrinkage cavity appears, either as a hole or a web-like, interconnected series of fine porosity cracks. In many cases, shrinkage voids can be prevented in the foundry by using carefully proportioned and positioned risers to feed the liquid metal to the affected area.

This is not effective for centre-line shrinkage. To eliminate this, the original design incorporates a tapered, rather than a uniform, metal section. In the tapered section, solidification proceeds gradually from the thinnest section towards the thickest. The last metal to freeze lies immediately adjacent to the riser for easy feeding.

New Quenchant for Steel. P. E. CARY, E. O. MAGNUS and W. E. HERRING. ("Metal Progress." 1958. Vol. 73; No. 3; pp. 79-81). Polyvinyl alcohol, when mixed 5 to 30 parts by weight with 10,000 parts of water, will reduce the quenching rate on medium-carbon steel parts sufficiently to eliminate cracks in most instances. As the austenitized part enters the solution, a vapour envelope forms. A viscous gel also appears around this envelope and the part remains hot much longer than when quenched in water. Cooling-rate determinations prove that quenching is slowed appreciably by the gel. This insulating envelope collapses, and the part cools rapidly.

The gel forms again, and re-dissolves when the cooling is completed. A thin vinyl film, which retards rusting, remains. Large gears, with a 32-in. dia. and a 3½-in. face width were pre-heated to 316 deg. C., rotated in an inductor and heated with 3,000-cycle current. After austenitizing, the gear was quenched with water and tempered at 316 deg. C. When water was replaced with polyvinyl solution, the fatigue life was approximately tripled. The quenching solution improved fatigue as much as shot-peening did; when both shot-peening and vinyl quenching were used, the greatest improvement was obtained.

Electron Beam for Purifying Alloys. ANON. ("Steel." 1958. Vol. 142; No. 12; pp. 108-9). A barrage of electrons is used to melt and cast refractory and high-melting-point metals. Heat for melting is supplied by an electron gun, which serves as the cathode and bombards the melt stock (the anode) with electrons. Molten metal drops into a water-cooled copper crucible, in which the heat, required to maintain a molten pool, is provided by electron bombardment. The molten pool surface is kept at a constant level as the solidified ingot is withdrawn downwards.

High vacuums are required—in the range of 0.01 to 0.1 microns. Carbon, hydrogen, and oxygen are removed rapidly. Impurities which form compounds having a vapour pressure of at least 10^{-5} atmosphere at the surface of the melt are usually removed easily. The process can be used for zone refining. There is no apparent limitation on the diameter of bar or ingot that can be processed, and castings up to 6-in. dia. have been made.

Use of Electronics in Steelworks. ANON. ("Steel." 1958. Vol. 142; No. 12; pp. 112-5). With rapid developments in communications, processing, inspection, and control, Weirton Steel Company established an electronics department in 1955. The company's installations include: (1) Audio-amplifier systems which are used on all raw-material handling operations, rolling mills and processing lines. (2) Radio communications on the inter-plant railway system. (3) Carrier radio communication which is used on moving cranes. The electronic device generates a signal which can be picked up by another crane on the same source of power. The crane operators are able to speak to each other and with the men on the floor. (4) Radio reflow induction heating. (5) Electronic weighing machines are used for weighing steel. (6) Electronic gauges. This company uses X-ray, β-ray, and contact gauges. A direct-reading spectrometer determines residual elements or special additions needed to produce a specified steel or iron, and closed-circuit television is used to control furnace charging. All electronic equipment is serviced and maintained by skilled personnel recruited from within the organization. They are required to pass periodic examinations to demonstrate their qualifications for advancement.

High-temperature Centrifuge for Creep, Rupture, and Bend Tests. I. I. KORNILOV. ("Journal of Metals." 1958. Vol. 10; No. 3; pp. 187-9). This method permits the simultaneous testing of a large number of specimens 4-in. long, 0.118 to 0.157-in. dia., and weighing 2.82 to 5.64 oz. at temperatures up to 1,200 deg. C. The machine permits simultaneous testing of 24 specimens, and tests can be carried out for small amounts of deformation, corresponding to creep conditions as well as tests for long-time rupture strength.

Publications Received

BCIRA Journal of Research and Development, Vol. 7, No. 5. Published by the British Cast Iron Research Association, Alvechurch, Birmingham.

This issue contains four reprints. The first is by Mr. F. T. Barwell and Dr. K. H. R. Wright, on "Fretting Corrosion of Cast Iron." The authors have summarized their conclusions in the following statement:—

In view of the importance of cast-iron surfaces in machinery and their susceptibility to fretting when subjected to vibration, an investigation has been made into the fretting properties of a number of grey cast-iron structures. A statistical approach is adopted because of the rather large scatter which is observed in fretting-wear experiments. The statistical design used enables the fretting behaviour of 12 different cast-iron surfaces to be investigated under seven conditions of lubrication, including the dry condition. Results show that lubricated cast-iron specimens in the as-cast condition exhibit less susceptibility to fretting than the annealed specimens. Liquid lubricants appear to be slightly more effective than greases: incorporation of "extreme pressure" additives in greases and molybdenum disulphide in oil appears to be of no benefit.

All the cast-iron surfaces examined behave less satisfactorily than hardened tool-steel specimens; when they are lubricated, there appears to be no strong correlation between the individual hardnesses of the cast-iron specimens and their susceptibility to fretting. Under dry conditions, however, marked differences are observed in performance of the samples, and there is some correlation between fretting damage and phosphorus content of the irons.

A second report is on the "Influence of Silicon Content on the Growth and Scaling Resistance of Cast Iron with Nodular Graphite." It is from Dr. R. J. Maitland and Mr. I. C. H. Hughes, and describes a research carried out at the Borough Polytechnic by Dr. Maitland when working for his PH.D. degree and in the laboratories of the BCIRA. The authors have provided the following short summary of their work:—

A study has been made of the growth and scaling behaviour of nodular-graphite irons having from 1.2 to 5.7 per cent. of silicon at temperatures within the range 650 to 1,000 deg. C. Both growth and scaling proceed relatively slowly and are inhibited by increasing silicon contents at temperatures below the austenite transformation range. When the critical temperature range is exceeded or nearly exceeded, growth and scaling become excessive and in this field silicon seems to promote growth and scaling.

A study of the work of others suggests that the growth resistance of a 5.7 per cent. silicon nodular iron is comparable with that of Silal up to 900 deg. C. at least.

The "General Principles of Cupola Operation" is the title of a report from Mr. H. J. Leyshon. This quite lengthy and interesting dissertation is well summarized in the author's conclusion, which reads:—

It has been shown that an increase in the combustion ratio coincides with an increase in the quantity of metal melted per pound of coke consumed. Consequently, the cost of coke per ton of iron melted will decrease with an increase in the carbon-dioxide content of the effluent gases. Purely from the standpoint of fuel economy, therefore, a definite saving will result from more complete combustion. But it has also been shown that as the efficiency of combustion increases, the losses of iron, silicon and manganese increase, and consequently the cost due to these losses will also rise.

For this reason, maximum economy is not necessarily obtained with maximum combustion efficiency, since the saving in coke may not counterbalance the cost of the elements lost. In addition, further metallurgical benefits are obtained by the use of high coke ratios. These are higher metal temperatures and higher carbon pick-up. The benefits derived from high coke charges are also obtained by the use of hot blast, when lower coke amounts may be used to achieve the same stage of combustion and metal temperature; the rich top gas can be used in a recuperative system to heat the blast, thus improving the overall thermal efficiency. A further advantage of the use of hot blast is that, in view of the higher combustion temperatures developed and the concomitant higher carbon pick-up that can be achieved, higher percentages of steel scrap can be melted. In view of the present-day price differential between pig-iron and steel scrap this is a very real economic advantage.

The use of basic slags facilitate desulphurization and carbon pick-up and the basic cupola was developed to meet requirements for low-sulphur and/or high-carbon irons. High-carbon irons in acid practice are produced from mixtures containing high percentages of pig-iron. The basic cupola is capable of reducing sulphur to very low levels and can achieve carbon pick-up greatly in excess of what can be accomplished in the acid cupola using comparable raw materials. High-carbon irons can be produced in the basic cupola from mixtures containing high percentages of steel scrap, and this has the additional advantage of making low-phosphorus irons available in applications where such irons are needed. In addition, higher percentages of foundry return scrap may be used without danger of producing irons with excessively high-sulphur content. The disadvantages of the basic cupola are the high cost of basic linings and the relatively high melting losses of silicon.

The slag composition can be varied and controlled within wide limits in the cupola by water cooling the melting zone to stabilize the refractory and eliminate contamination of the slag during melting. Conditions of slag basicity favouring high-carbon pick-up and low-sulphur content of the metal are not compatible with those favouring low-silicon loss, but the application of hot blast would give a more favourable balance in this direction.

Due to the advances in knowledge and technique in comparatively recent years, the cupola has developed from a relatively crude re-melting unit into a valuable metallurgical furnace of wider application which is demanding an increasing degree of technical control and skill on the part of the foundry metallurgist.

The final report is on the "Chemical Analysis of Cupola Slags," by Mr. W. E. Clarke. It should be consulted by the staffs of all ironfoundry laboratories.

Process Heating Data (2nd Edition). Published by the Process Heating Department of the General Electric Company, Limited, Magnet House, Kingsway, London, W.C.2; price 5s.

This pocket-book carries a wealth of data for those whose work it is to handle heating apparatus—especially electrical, but it is by no means restricted to this field, as it includes mensuration; the composition of steels, with a guide as to their use; the Greek alphabet and a host of other information not easily obtainable in a single book. The modest price asked for this book, even though there are references to GEC trade literature beneath the pictures, makes it very good value indeed.

Company News

ICI Employees Qualify for Bonus

Over 90,000 employees of Imperial Chemical Industries, Limited, have qualified for bonus in respect of 1957 under the company's profit-sharing scheme. The bonus amounts to £4,993,000 gross (an average per employee of £54 17s. 6d.), which, after deducting personal income tax, is £3,716,000 (average per employee, £40 16s. 9d.). The net bonus has been paid to the trustees who will use it to acquire on behalf of employees £2,866,000 ICI ordinary stock.

When an employee has 40 or more stock units standing to his credit, arrangements are made for the stock to be registered in his name. This year £1,987,000 ordinary stock will be handed over to just over 30,000 employees and once it is handed over employees are free to deal with it as they wish. Since the scheme started in 1954 over 60 per cent. of the stock handed to employees has been retained by them.

Holders of nearly two thirds of ICI £40,000,000 convertible loan stock took the first opportunity to convert into ordinary shares. During July £24,300,000 loan stock was converted into 17,500,000 £1 ordinary shares. The conversion was made on the revised basis of 36 ordinary shares for every £50 loan stock. The next opportunity for conversion will be in July, 1959, when 34½ shares will be offered for each £50 stock, and the last chance will be in July the following year at the rate of 33 shares for each £50 stock.

Stothert & Pitt Dividend

A total ordinary distribution of 25 per cent. for the year to June 30, 1958, against the previous equivalent of 11¼ per cent., is forecast by the directors of Stothert & Pitt, Limited, the Bath (Somerset) engineers and ironfounders, etc., in a circular giving their reasons for rejecting the Spencer (Melksham), Limited, bid. The directors also announce their intention of making a further scrip issue, this time on a one-for-three basis.

The chairman of Stothert & Pitt, Sir Llewellyn T. G. Soulsby, says that heavy capital expenditure has now come to an end and with the benefits accruing from it and from increasing development the board considers that a more liberal dividend policy can now be adopted and maintained. In the absence of unforeseen circumstances it is intended to pay on August 20 a second interim ordinary dividend of 12½ per cent., and in due course to recommend a final dividend of 7½ per cent. These dividends will bring the total distribution for the year up to 25 per cent. on the ordinary capital as increased by the 50 per cent. capitalization issue made in August.

On this rate of dividend the income on one Stothert & Pitt ordinary share would be 5s. gross, compared with 4s. 3d. gross which holders might expect to receive if they accepted the Spencer (Melksham) offer and it became binding. All dividends paid after June 30, 1958, on the ordinary shares of Stothert & Pitt, the holders of which accept the Spencer offer, will, if the offer should become binding, belong to Spencer (Melksham).

The directors state that the valuation of the fixed assets made last year by professional valuers shows a surplus on revaluation at June 30, 1957, of £1,223,195, bringing the total net assets at that date up to £4,228,055, or 55s. 4d. an ordinary share. It is intended to introduce this surplus into the accounts as soon as possible and to recommend that from the resulting additional reserve £500,000 be capitalized by the one-for-three issue.

JOHNSON, MATTHEY & COMPANY, LIMITED, precious metal smelters, refiners, and engineers, of London, E.C.1—Estimated earnings for the four months from April to July were about two thirds of those for the same period of 1957, Mr. G. C. H. Matthey, chairman, stated at the recent meeting. "It would be idle to prophesy what the results will be for the full year," he continued, "but bearing in mind that our dividend for the previous year was nearly four times covered by earnings, I trust that what I have now said will serve to give you some reassurance."

HILLS (WEST BROMWICH), LIMITED, manufacturers and engineers to the building trades—The directors state that they are unable to recommend an interim dividend on the ordinary capital for the year ended July 31, 1958, as losses, although on a much reduced scale, have been incurred to date, reflecting the persisting adverse trading conditions generally in this industry. Considerable economies have been made and the company is currently running on a more satisfactory basis. There is, however, need to build up the order-book to maintain and strengthen the present position.

UNITED GAS INDUSTRIES, LIMITED—There was some reorganization in the group structure in the year ended March 31, 1958, in the interests of administrative efficiency, says Mr. N. L. Smith, chairman. In order to meet changing conditions, two separate manufacturing divisions have been set up. Should the demand for some of the new products fail to rise in accordance with expectations, the directors will not be deterred from carrying out their declared policy of diversification, the chairman adds. Group trading profits were virtually unaltered at £472,392 in 1957-58 (£472,251). The ordinary dividend has been cut from 14 per cent. to 12¼ per cent., and that on the deferred from 112½ per cent. to 70⅝ per cent.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

HENDON, August 22—Requirements of the Borough Council include castings. Documents from the Borough Engineer and Surveyor, Town Hall, Hendon, N.W.4.

DEVIZES, September 5—Construction of approximately 830 lin. yd. spun-iron water mains, 6-in. dia., with incidental works. Documents from A. H. S. Waters & Partners, 25, Temple Row, Birmingham, 2. Deposit £5 5s. 0d.

LIVERPOOL, August 23—Supply and installation of three centrifugal pumping units. Documents from City Engineer and Surveyor, Municipal Buildings, Liverpool.

BISHOP'S CASTLE, September 15—Construction of approximately 2,420 lin. yd. of 6-in. dia. spun-iron water main including fittings and chambers. Documents from Wilcox, Raikes & Marshall, 33, Great Charles Street, Birmingham, 3. Deposit £3 3s. 0d.

DRIFFIELD, August 23—Sewerage and sewage disposal, parishes of Hutton Cranswick and Watton, for R.D.C. Works include approximately 620 lin. yd. 3-in. dia. cast-iron pumping main and about 2,022 lin. yd. 4-in. dia. cast-iron pumping main. Documents from R. B. Tollett, Clerk of the Council, Council Offices, West Garth, Driffield, Yorks. Deposit £5.

THAILAND, October 15—70 four-wheeled all-steel underframe salt wagons. (ESB/17626/58.)

YUGOSLAVIA—"Komercbiro," Kosmajska, 50 (P.O. Box 901), Belgrade, have informed the British Embassy at Belgrade that they wish to receive details (including catalogues, specifications, delivery dates and prices) for complete road-making and finishing machines. (ESB/19423/58.)

THAILAND, September 16—Steel underframes of bogie tank wagons. (ESB/19591/58.)

SOUTH AFRICA, August 21—Requirements include cast-iron working standard 50-lb. weights. (ESB/17695/58.)

SOUTH AFRICA, August 22—Air compressors. (ESB/19165/58.)

PAKISTAN, August 26—Machine tools. (ESB/19126/58/1CA.)

Personal

Mr. F. W. E. SPIES has been promoted to the position of assistant director of the Royal Dutch Iron and Steel Works.

Mr. J. HENDERSON, until lately with Daimler Company, Limited, has been appointed foundry general manager with Hepworth & Grandage, Limited, Bradford.

Mr. W. ERNEST BRADLEY and Mr. RONALD MOUNTAIN have been appointed to the Huddersfield and London sales offices, respectively, of Brook Motors, Limited, as sales engineers.

Mr. HARRY TEMPEST has retired after 62 years with the firm of Dawson, Payne and Elliott, Limited, printers' engineers, of Otley, which is the longest service record in the history of the firm.

Mr. T. B. PRESTON, retiring chairman and managing director of Mitchell Russell & Company, Limited, iron-founders, Bonnybridge, was presented with a pair of binoculars from the workers and a ciné-camera from the staff at Chattan Foundry.

Sir FREDERICK PICKWORTH, Sheffield Master Cutler and chairman of English Steel Corporation, Limited, is on a business tour of Canada, visiting mainly eastern Canada. A trip to New York is also on the itinerary. He returns on August 26.

Dr. ROBERT KENNEDY, principal lecturer on the strength of materials at the Royal College of Science and Technology, Glasgow, is visiting the Engineering University of Lima, Peru, for six weeks, to lecture and assist in organizing engineering studies under the British Council's scheme for advisory visits to Latin America.

Mr. JOHN STEELE, who has joined the board of Lawrence H. Tearle & Company (Pty), Limited, publishers of technical journals, has been presented with a ciné outfit by Mr. Douglas Kent, managing director of Foundry Services (SA) (Pty), Limited, on behalf of the staff of that company and E. L. Midgley (SA) (Pty), Limited, as a parting gift.

Mr. JOHN BARRY recently retired from the foundry of W. Shaw & Company, Limited, at the age of 80. Mr. Barry, who was presented with a wallet of notes from the staff and a cheque from the company, worked in the dressings department. He announced at the presentation that he was going to look for another job! He has worked at Shaw's since he was 68.

Mrs. KATHLEEN BAKER, a foundry coremaker at the Commercial Street works of James Brown & Sons, Limited, engineers, brassfounders and coppersmiths, was the recipient in three presentations—two from the firm and one from her workmates—on her retirement at 65. Mrs. Baker joined the foundry during the war and was the first woman employee to reach pensionable age with the firm. The company gave her a clock and gift of money, from her colleagues she received a silver tea-service.

Mr. D. S. M. BARRIE, chief public relations officer of the British Transport Commission, has been appointed assistant secretary general. The appointment forms part of a reorganization under which it has been decided to discontinue the existence of the separate general duties branch under the chief of general duties. The post of chief of general duties has been abolished and the work of the hitherto separate general duties department is being absorbed into the secretary general's office.

E. H. Jones (Machine Tools), Limited, of Hove, announce the following changes in personnel have taken place within their organization: Mr. L. R. NEWING has been appointed outside sales manager for home sales; Mr. H. M. LEBRECHT, A.M.I.MECH.E., who has been manager of the special-machinery sales division for some time, has been appointed inside sales manager and Mr. G. CRANSTON has been appointed area manager for Scotland where a new office and showroom will shortly be opened at Wilson Place, Nerston Industrial Estate, East Kilbride.

Awards of three Fellowships for post-graduate research are announced by the British Oxygen Company, Limited. The awards have been made to Mr. P. G. CLAY, of King's College, Newcastle-upon-Tyne, for research in the Department of Chemistry at the college; Mr. R. E. RAAB, of the University of Natal and Oxford University, for research work in the Physical Chemistry Laboratory at Oxford, and Mr. G. SAVILLE, of Oxford University, for work in the Inorganic Chemistry Laboratory at Oxford. Renewal of Fellowship for a third year has been granted to Mr. N. G. PARSONAGE for work in the Inorganic Chemistry Laboratory at Oxford University.

Lips N.V., Drunen, Holland, announce that Dr. E. M. H. LIPS has been appointed technical director of the company as from September 1. During many years Dr. Lips has been in charge of the management of the metallurgical laboratory of Philips N.V. in Eindhoven. In this function he had many contacts with important industries and scientific institutes at home and abroad, and is thus well known in both Dutch and international circles. He is a member of the Council of *Nederlandse Vereniging van Gieterij Technici* (Dutch society of foundry technical associations); *Gieterij Stichting* (foundry institution) and *Metaal Instituut T.N.O.* (Metal Institute). Dr. Lips attended discussions in Washington as a representative of the Dutch Government.

Return to full-time duties of Mr. I. S. SCOTT-MAXWELL as assistant general manager (engineering and development) of the steel division is announced by the Steel Company of Wales, Limited. Mr. Scott-Maxwell had been unable to carry out his duties for an extended period owing to illness. The company confirms the appointment of Mr. J. H. GROOCOCK, who was formerly chief electrical engineer, as chief engineer, and of Mr. H. D. MORGAN as chief electrical engineer. A member of the Institution of Electrical Engineers and a past chairman of the West Wales Subcentre of the institution, Mr. Groocock joined the Steel Company of Wales as chief electrical engineer of the steel division in 1950. Mr. Morgan, who was engaged on electrical design and construction of the Abbey Works while with MacLellan & Partners, transferred to the Steel Company of Wales in 1950. He was appointed Abbey Works electrical engineer and deputy chief electrical engineer of the steel division of the company.

Obituary

The death occurred on August 3, at the age of 82, of Mr. AXEL AXELSON JOHNSON, the Swedish shipowner and industrialist. He was chairman of Rederiaktiebolaget Nordstjernen (the Johnson Line), Stockholm, and head of the Avesta iron-ore mines.

Mr. ALEXANDER PARK TRAILL, managing director of the Manchester Dry Docks Company, Limited, and a vice-president of the Institute of Marine Engineers, died on August 2 at the age of 81. Mr. Traill was appointed a director of the company in 1931. He was chairman of the Dry Dock Owners' and Repairers' General Council in 1952-53. Mr. Traill was also a past president of the Manchester Metallurgical Society.

Raw Material Markets

Iron and Steel

The holiday season has brought demand and production of castings practically to a standstill. Chiefly affected are the producers of pig-iron as the major portion of their outputs in all grades of pig-iron is being placed into stock on account of the suspension in deliveries. This stocking will increase appreciably the substantial tonnages already on hand, and apart from the lack of sales, the double handling will involve additional overhead costs.

Although some blast furnaces have been put out of commission while others are on short blast (necessitated by the lessened demand and over-production), the 90 or so furnaces now producing, as against the 100 units in blast a year ago, are making more than sufficient pig-iron to meet present demands. Stocks in consequence increase daily. Additional export business would be welcomed by the furnaces to enable them to reduce stocks, but, although some orders are being obtained, it is in many instances difficult to meet the keen competition from makers abroad.

On resumption of work the foundries will be able to obtain requirements of raw materials promptly as, apart from the stocks of pig-iron held at the furnaces, scrap in all grades and most brands of foundry and heating cokes are plentiful. Improved demands for castings are looked for, especially by the light foundries, as for a long time now the call for light castings has been small and many of these foundries are either on short-time or working much below capacity. The textile foundries and most of the jobbing foundries are also in need of more work. The motor-car industry, which has kept many of the engineering foundries busy for a long time, continues to use large quantities of high-duty castings, and with the demands from many other trades the engineering and speciality foundries are assured of steady outputs for some time ahead. At many of these foundries, however, capacity is available to undertake increased business, particularly for machine-tool makers and some of the engineering trades from which demands are not now so heavy.

Holiday influences also affect the re-rollers. With the small amount of work on hand, the interruption in production causes no serious difficulties. Additional business is needed in all sections to keep plants fully employed, as for some time now most units have been on short time and it has been difficult to find sufficient work to keep the mills going for the guaranteed four-day week.

Plentiful supplies of steel semis in all grades and sizes are easily obtained from home steelworks and they are in a position appreciably to increase current outputs. With the small amount of work on hand and the material in stock, the re-rollers' demands are very moderate. Some export business is on hand, but much more could be undertaken if only it could be obtained against the strong competition from overseas makers.

Non-ferrous Metals

The strength of copper in the face of seeming adversity, resulting in the gradual, but persistent, rise in the quotation on both sides of the Atlantic, has been a distinct market feature in recent weeks. The steadiness of the undertone is, in fact, all the more impressive when it is considered that the main holiday period has now arrived and that many works will be closed down during the next fortnight.

However, confidence was slightly unseated last week on the news that Kennecott had decided to increase its working week from four days to five days at its four mines in Arizona, Nevada, New Mexico, and Utah, which, in total, represents an additional 25 per cent. increase on Kennecott's rate of production. This was followed by a wave of uneasiness at the prospect that the US House of Representatives might not approve the bill authorizing the envisaged stockpiling programme before the summer vacation. At the same time, business in the US at the uniform price level of 27 cents a pound was not good and the end result was to lead the customs smelters to lower their price by ½ cent to 26½ cents a pound—the producers' price remaining unchanged at 27 cents. These events unsteadied the London market and the price dropped £3 10s. However, at the close of last week the announcement from the European Mineworkers' Union in Northern Rhodesia that it had imposed a ban on overtime by all daily paid white workers at the Nkana Mine was sufficiently bullish to turn the market around and all the previous losses were recovered. The ban on overtime was due to come into effect on Monday and was to be introduced because of the deliberate attacks regarding demarcation between operators and artisans. Action was, however, postponed at the last minute.

Tin is dull on both sides of the Atlantic. Consumers are still reluctant to come into this market, the Russian menace has not yet been settled, and the London cash price is hovering around its support point of £730 a ton. In the US the quotation has come back to less than 95½ cents a pound.

Lead is featureless, with the quotation in London once again drifting down towards £70 a ton. In America the market is slow and the price is 11 cents a pound.

Zinc, like lead, is under the influence of the position and prospects for the passage of the Minerals Stabilization Bill and the price in London is fluctuating narrowly. The offtake is fair, while in New York inquiry has broadened for "Prime Western," the basic price of which remains unaltered at 10 cents a pound.

Latest Foundry Statistics

Steel Castings. Lower levels of industrial activity are disclosed in the July statistical *Bulletin* issued by the Iron and Steel Board and the British Iron and Steel Federation. Thus employment figures taken on June 7, show a reduction, at 19,810, of 190 whilst compared with a year ago, the loss to the steelfoundry industry is 680. The average weekly production of steel castings was estimated at 6,100 tons for June, which was a better figure than for May, when the output was given at 5,500 tons, but much lower than June 1957 when 6,900 tons was attained. The averages for the first five months of this year show that the weekly average figure is 400 tons lower than in 1957.

Industrial Production Falls Sharply

Latest official estimates of industrial production in June show a sharp fall. The Treasury index for all industries in June was 137-138—the index for June, 1957, was 141. After allowing for seasonal changes the indices show that output in June was between 5 and 6 per cent. lower than for the corresponding period last year.

The gap has steadily widened since April when the 1958 index of 136 was one point below April, 1957. Last year output rose sharply in May and June, but this year the trend has been in the opposite direction.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

August 13, 1958

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.: N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £47 0s. 0d. to £47 10s. 0d., scale 17s. 0d. per unit; 75 per cent. Si, £66 0s. 0d. to £66 10s. 0d., scale 17s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 6s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 9s. 6d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £83 10s. 0d. to £87 0s. 0d., basis 60 per cent. Cr, scale 30s. 0d. to 30s. 6d., per unit; over 6 per cent. C, £79 10s. 0d. to £85 0s. 0d., basis 60 per cent. Cr, scale 30s. 6d. per unit; 2 per cent. C,* 2s. 0d. per lb. Cr; 1 per cent. C,* 2s. 0½d. per lb. Cr; 0.15 per cent. C,* 2s. 1½d. per lb. Cr; 0.10 per cent. C,* 2s. 1¾d. per lb. Cr; 0.06 per cent. C,* 2s. 2d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £265 0s. 0d.; 96/98 per cent., £295 0s. 0d.

Ferro-columbium.—65/72 per cent., Nb + Ta, 19s. 9d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £78 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., £32 15s. 6d.; tested, 0.08 to 0.33 per cent. C, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), £34 17s. 0d.; silico-manganese, £43 16s. 6d.; free-cutting, £36 14s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £40 0s. 6d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £44 16s. 0d.; black sheets (hand mill), 24g., £58 14s. 6d.; galvanized corrugated sheets, 24g., £66 16s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 11s. 0d.; nickel-chrome-molybdenum, £111 19s. 0d.

NON-FERROUS METALS

Copper.—Cash, £205 5s. 0d. to £205 15s. 0d.; three months, £206 0s. 0d. to £206 5s. 0d.; settlement, £205 15s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 1s. 11⅛d. per lb.; rods, 236s. 0d. per cwt. basis; 20 s.w.g., 269s. 0d. per cwt.

Tin.—Cash, £730 0s. 0d. to £730 10s. 0d.; three months, £731 0s. 0d. to £731 10s. 0d.; settlement, £730 10s. 0d.

Lead (Refined Pig).—First half August, £70 0s. 0d. to £70 5s. 0d.; first half November, £72 0s. 0d. to £72 5s. 0d.

Zinc.—First half August, £63 12s 6d. to £63 17s. 6d.; first half November, £64 12s. 6d. to £64 15s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £98 10s. 0d.; rolled zinc (boiler plates), all English destinations, £96 12s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £87 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 7⅛d. per lb.; sheets to 10 w.g., 172s. 9d. per cwt.; wire, 2s. 5¼d.; rolled metal, 172s. 9d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £141; B6 (85/15), —; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £170; HTB2 (38 tons), —; HTB 3 (48 tons),—.

Gunmetal.—BS1400, LG2 (85/5/5/5), £172; LG3 (86/7/5/2), £183; G1 (88/10/2/⅛), £245; (88/10/2/1), £229.

Phosphor Bronze.—BS1400, PB1 (AID released), £255 per ton.

Phosphor Bronze Strip, etc.—Strip, 259s. 6d. per cwt.; wire, 3s. 8⅛d. per lb.; rods, 3s. 0⅛d.; tubes, 3s. 0⅛d.; chill cast bars: solids 3s. 0¼d.; cored 3s. 1¼d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 7d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 11⅛d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 10⅛d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £79 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £213; AB2, £230.

* Average 68-70 per cent.

Increases in Capital

NEWEY & EYRE, LIMITED, electrical and mechanical engineers, etc., of Birmingham, increased by £50,000, in £1 ordinary shares, beyond the registered capital of £200,000.

PRECONOMY COMPANY, LIMITED, tool designers, engineers, etc., of Sutton-in-Ashfield (Notts), increased by £10,000, in £1 ordinary shares, beyond the registered capital of £10,000.

YORKSHIRE IMPERIAL METALS, LIMITED, Leeds, increased by £997,900, in 499,900 "A" ordinary and 498,000 "B" ordinary shares of £1 each, beyond the registered capital of £2,100.

RADNOR HOLDINGS, LIMITED, brass and copper tube manufacturers, etc., of Hockley, Birmingham, increased by £10,000, in £1 ordinary shares, beyond the registered capital of £30,000.

W. W. BROWN & PARTNERS, LIMITED, manufacturers of mechanical handling plant, etc., of London, E.C.2, increased by £10,000, in £1 shares, beyond the registered capital of £5,000.

ARIEL PRESSINGS, LIMITED, Ilkeston (Derbyshire), increased by £60,000, in 25,000 ordinary and 35,000 8 per cent. cumulative preference shares of £1 each, beyond the registered capital of £15,000.

OIL WELL ENGINEERING COMPANY, LIMITED, Cheadle Heath, near Stockport, increased by £450,000, in 225,000 "A" and 225,000 "B" shares of £1 each, beyond the registered capital of £450,000.

BROWNE & SHARPE, LIMITED, manufacturers of screw, milling, and grinding machines, etc., of Plymouth, increased by £200,000, in £1 ordinary shares, beyond the registered capital of £500,000.

MITCHELL, SHACKLETON & COMPANY, LIMITED, crankshaft makers and forgemasters, etc., of Patricroft, Manchester, increased by £300,000, in 10s. ordinary shares, beyond the registered capital of £300,000.

DUST CONTROL PROCESSES, LIMITED, Cockerton, Darlington (Co. Durham), increased by £19,900, in 15,000 7 per cent. cumulative redeemable preference and 4,900 ordinary shares of £1 each, beyond the registered capital of £100.

COLD FORGING, LIMITED, London, W.1, increased by £240,000, in £1 ordinary shares, beyond the registered capital of £10,000.

MILES DRUCE STEEL, LIMITED, London, W.3, increased by £199,900, in £1 ordinary shares, beyond the registered capital of £100.

FLEXELLO CASTORS & WHEELS, LIMITED, Slough (Bucks), increased by £50,000, in £1 shares, beyond the registered capital of £50,000.

BRITISH METAL CRATES, LIMITED, Stockport (Lancs), increased by £20,000, in £1 "A" ordinary shares, beyond the registered capital of £1,000.

RANI, LIMITED, dealers in iron and steel, etc., of London, E.3, increased by £10,000, in £1 shares, beyond the registered capital of £1,000.

POWER TOOLS (SPECIALISTS), LIMITED, Birmingham, increased by £18,000, in £1 ordinary shares, beyond the registered capital of £12,000.

ELECTRO-MECHANICAL SUPPLIES, LIMITED, London, S.W.9, increased by £11,000, in £1 ordinary shares, beyond the registered capital of £3,000.

MITCHAM JIG & PRESS TOOL COMPANY, LIMITED, Mitcham (Surrey), increased by £48,500, in £1 shares, beyond the registered capital of £1,500.

The death is announced of Mr. WALTER W. MITCHELL, chairman and managing director of Grahamston Iron Company, Limited. He was in his 78th year. Mr. Mitchell, who had been associated with the company for over 60 years, was educated at Falkirk High School and Daniel Stewart's College, Edinburgh. He was a son of Bailie William T. Mitchell, who founded the company in 1868, and became managing director on the death of his brother-in-law, Mr. Thomas Downie, in 1926. As well as being chairman of Grahamston Iron Company, Limited, he was a director of T. L. Duff & Company, Limited, shipbrokers, Glasgow. Mr. Mitchell was one of the best-known figures in the Scottish ironfounding industry and had a lifelong experience in this connection. He had a practical knowledge of all sections of the industry, being specially interested in metallurgy. He played a prominent part in the successful formation and operation of the British Ironfounders' Association and the National Light Castings Ironfounders' Federation and always took special interest in the provision of good working conditions for his company's employees. This eventually led to the opening of the new canteen and baths in 1949, in both of which the latest equipment was installed for the comfort and wellbeing of the men. These amenities have since been further improved.

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New Catalogues

Conveyors. In list No. 306, J. Collis & Sons, Limited, Regent Square, Gray's Inn Road, London, W.C.1, describe and illustrate a number of different types of conveyors. Starting with a wide range of plain gravity-type roller-conveyors, of which their make is trade marked RolaVeyor, the catalogue next deals with the TransVeyor, which is a table carrying in recesses a geometric pattern of hardened-steel balls, running in ball races. Next there is shown a double string of chain, carrying at intervals trays for elevating goods from one floor to another. After showing the LoadaVeyor, which is a portable inclined-band or slat conveyor well suited for servicing lorries, a section covers slat conveyors adapted for taking loads to a higher level. Finally, a line of belt conveyors is shown, but there is also a special catalogue, No. 307, devoted to this subject. A third publication, No. 308, covers that universally acknowledged labour-saver—the pallet-type truck. The one described is of the hand-operated type with hydraulic gear for lifting and lowering.

Industrial Buildings. A brochure received from Taylor Woodrow (Building Exports), Limited, 41, Welbeck Street, London, W.1, illustrates and describes buildings with Arcon saw-tooth roof structures. Five very large firms constitute the Arcon group, and Taylor Woodrow undertakes the marketing of the products. The brochure carries on its front cover a coloured picture of a Monmouth engineering works. Its artistic appearance is enhanced by the masking of the saw-tooth roof by a frontage wall carried to the tops of the ridges and by its being surrounded by a well-laid-out garden. Arcon roof structures, being standardized and prefabricated, are quick to erect and give a maximum amount of working space combined with ease of extension. Foundries considering removal, extension or rebuilding premises, should certainly send for this brochure.

Moulding Machines. A loose-leaf binder, the covers of which are carried out in green plastic, has been used by the British Moulding Machine Company, Limited, Weston Works, Faversham, Kent, for a general catalogue, which, it is understood, is designed, printed and assembled at Weston Works. It has lost nothing and perhaps has gained thereby, because the reference tabs, being hand typed, convey the impression that the catalogue is a personal affair. The system followed has been to give for each of the eight types of machines covered a foundation plan and a general specification, together with much ancillary information —such as means of mould removal and details of components built into the machines. A specimen of a formal guarantee and details of servicing are also included. This catalogue ranks very high amongst the trade literature produced by the foundry-equipment industry, and the publicity and printing departments of this concern are to be congratulated on its production.

Air-powered Portable and Stationary Tools. In publication No. 443 T.E., Broom & Wade, Limited, High Wycombe, describe and illustrate " Aro-Broomwade " Par-a-matics, which are designed to carry out drilling, burring, grinding, screw driving, nut setting, tapping and reaming. These tools well respond to the demands of flow-line production. In the eight pages of the brochure a wealth of technical data have been included.

Precision Investment Castings. From Gray-Syracuse, Inc., of West Seneca Street, Manlius, N.Y., U.S.A., has been received an eight-page brochure of a most interesting character. The presentation is alike, neat and dignified, due to the choice of a blue-grey for illustration. All the castings shown, and there are over 40, are either of full- or half-size. They are of varying complexity, which show up well the versatility of the investment process.

Materials Handling Equipment. The Ensign Conveyor Company, Limited, Albert Street, Bulwell, Nottingham, which is the materials handling division of Thos. W. Ward, Limited, have recently published a 28-page brochure covering a variety of conveyors and feeders, ranging from troughed-belt to the chain and slat types. Amongst the units illustrated and described is a useful line of portable conveyors.

Hoists and Rams. Consolidated Pneumatic Tool Company, of 232, Dawes Road, London, S.W.6, have issued a 24-page brochure dealing with the company's range of pneumatic hoists and rams. Among the new models detailed for the first time in the brochure are the cushioned ram; rams equipped with movable trunnions; and the pendant hoist with sensitive control valve.

Resistor Electric Furnaces. Royce Electric Furnaces, Limited, Sir Richard's Bridge, Walton-on-Thames, Surrey, have described a wide range of bespoke electric furnaces in a 13-page well-illustrated catalogue. It includes the bell-type, pit furnaces, box and tube furnaces; some of which are conveyorized for continuous heat-treatment. A number of different industries is catered for.

Bench-type Muffle Furnaces. In leaflet M.21A, Metalectric Furnaces, Limited, Cornwall Road, Smethwick 40, Staffs, describe and illustrate a range of three electric laboratory or heat-treatment furnaces. These reach a temperature of 1,000 deg. C. A manual control is attached, through which power input and, hence, the temperature, is regulatable.

Hot-blast Cupola Equipment. Bulletin No. 586, received from the Brown Thermal Development Company, of Elyria, Ohio, USA, covers the subject of air heaters, of which two types are made by the company. One—type 202—is designed for temperatures up to about 300 deg. C., and the second, type 204, heats the air up to about 550 deg. C., utilizing finned tubes.

Swarf-collecting Unit. A four-page folder released by the Sturtevant Engineering Company, Limited, Cannon Street, London, E.C.4, illustrates and describes a portable swarf-collecting unit suitable for positioning at the side of machine-tools cutting cast iron. An important claim is that as a result of its use there is reduced wear on machine tables and slideways.

Thermal Insulation for Shops. The Universal Asbestos Manufacturing Company, Limited, of Tolpits, Watford, have used a leaflet to describe and illustrate a system the company has developed for insulating existing buildings from the outside, particularly for those with sheeted roofs. Superimposed on the existing roof is a layer of glass fibre and new overlay sheets.

VICTOR PRODUCTS (WALLSEND), LIMITED, G.P.O. Box No. 10, Wallsend-on-Tyne, announce that they have made a re-issue of their technical bulletin *Water in Air*—which is in effect an appreciation of the cause and elimination of water in compressed air.